A Field Guide for Identification and Interpretation of the Interior Cedar – Hemlock Zone, Northwestern Transitional Subzone (ICHg), in the Prince Rupert Forest Region

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A Field Guide for Identification and Interpretation of the Interior Cedar – Hemlock Zone, Northwestern Transitional Subzone (ICHg), in the Prince Rupert Forest Region

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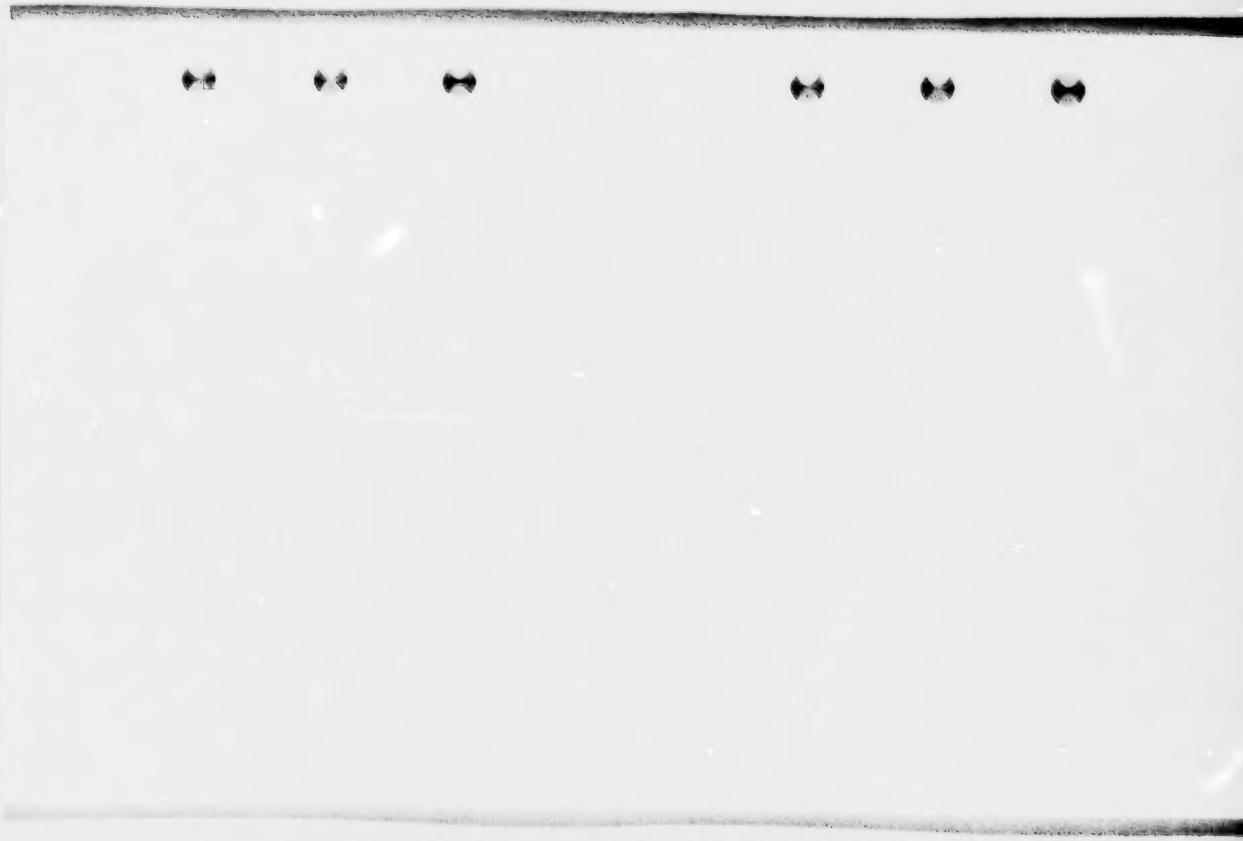


1 INTRODUCTION

This field guide presents a summary of ecological and management information for the Interior Cedar - Hemlock Zone, Northwestern Transitional Subzone (ICHg) in the Prince Rupert Forest Region (Figure 1). The guide is not a comprehensive technical report; information has been extracted from a more detailed technical publication (Haeussler et al. 1985). Additionally, this guide is a first approximation based on extensive sampling and, therefore, is subject to revision as more data become available. The silvicultural recommendations should be considered guidelines, and used as aids in making management decisions.

We assume that the users of this guide have been trained in basic concepts of site, soil, and vegetation evaluation during B.C. Ministry of Forests courses provided by the regional research staff. Consequently, the field guide does not include material on plant identification, hand texturing, or soil classification and humus forms. To identify questionable or unknown plants, refer to Coupe et al. (1982). Consult Haeussler et al. (1985) for further information on principles and philosophy, on methods underpinning the classification, and on the physiography, geology, terrain, and climate of the ICHg; and for more detailed interpretations of the ecosystems of the ICHg. Further enquiries should be directed to the Regional Ecologist, Prince Rupert Region.

The guide includes brief explanations of the biogeoclimatic variants, ecosystem units, and silvicultural prescriptions. Ecological information and identification keys are provided to assist the user in determining the ecological units and making silvicultural interpretations.

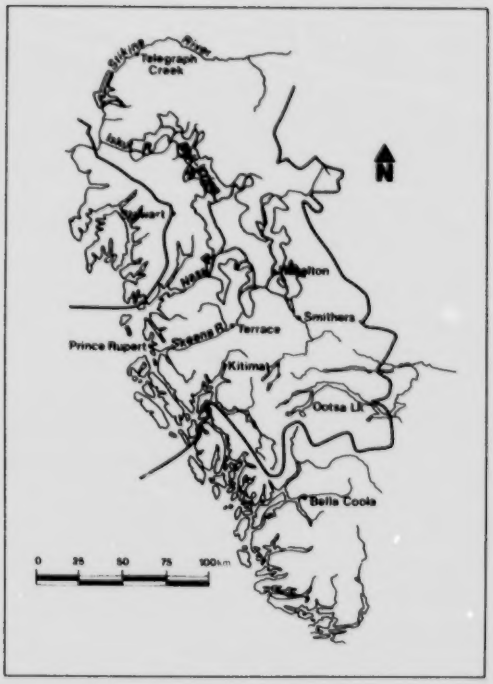
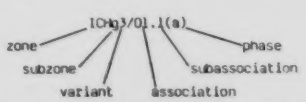


FIGURE 1. The Interior Cedar - Hemlock Zone, Northwestern Transitional Subzone (ICHg) in the Prince Rupert Forest Region.

2 USE OF THE GUIDE

The B.C. Ministry of Forests classification of ecosystems is arranged into a hierarchy that may be thought of as having two primary levels: biogeoclimatic and ecosystematic. Biogeoclimatic categories include the zone, subzone, and variant; ecosystematic categories include the association, subassociation, and phase. A standard code is used to denote these categories. For example:



In addition, connotative common names are generally applied to the various categories, for example the "lithic phase of the Dry hemlock - moss association".

Using the guide involves two main steps: first, identifying the biogeoclimatic subzone and variant; second, identifying the ecosystem association or subassociation, and phase where defined.

The guide is structured in a standard format for each biogeoclimatic variant, with the following information provided to assist the user in identifying the ecological units:

- a map of the biogeoclimatic variant
- edatopic grid
- key to ecosystem units
- slope transect
- habitat features of the ecosystem units
- description and interpretation of the ecosystem units.

2.1 Identifying Subzones and Variants

Section 3 of this guide presents information required to determine the biogeoclimatic subzone and variant, including a map, one table presenting diagnostic floristic elements of the ICHg and neighbouring subzones of the CWH, SBS, and ESSF, and a second table summarizing general

ecological features of the five variants of the ICHg. Larger scale maps are available for reference. Maps at a scale of 1:500 000 are included in Haeussler et al. (1985); 1:250 000 maps are on file in the Prince Rupert Forest Region office in Smithers.

To determine the subzone, the user should first consult a map of appropriate scale and verify by checking with the floristic and environmental features of Tables 1 and 2. If the area in question is near a subzone boundary and doubt still remains after the verification step using Tables 1 and 2, then try to identify the ecosystem for both feasible subzones. Compare the descriptions and interpretations for both ecosystems and apply the information that appears most appropriate. The guide should NOT be used for areas that have not been mapped or have not had their ecosystem units described.

2.2 Identifying Ecosystem Units

Sections 4, 5, 6, and 7 present information for the ICHg1, g1a, g2, and g3, respectively, of the Prince Rupert Forest Region. These sections include information needed to identify the various ecosystem associations, subassociations, and phases of the four biogeoclimatic units; and include recommendations for ecosystem-specific, silvicultural practices. Sections 8 and 9 provide some preliminary information about the incompletely studied ICHg4 and g5.

The following steps are suggested for identifying the ecosystem unit:

Step 1.

Consult a biogeoclimatic map and Tables 1 and 2 to determine the subzone and variant in which the site occurs.

Step 2.

Walk the area in question and note the site and soil factors needed to assess the moisture and nutrient regimes. Watch for pronounced differences in topography, wetness, or vegetation that would indicate that more than one ecosystem may be present. For each relatively similar area, determine the moisture and nutrient regime to place the site on the edatopic grid. Consider such factors as landscape

TABLE 1. Synopsis of vegetation characteristics of the ICHg and adjacent biogeoclimatic zones and subzones

Key:**** eldom/trad & dom/ind *** eldom/trad ** common * uncommon . rare - absent Vegetation characteristics	Biogeoclimatic zones and subzones ESSF alpine tundra / krummholz zone, Hudsonian / Engelmann spruce - subalpine fir zone, moist / wet subzone	ICH montane western hemlock zone, western hemlock - Amabilis fir subzone, wet / very wet subzone	IDF submontane interior zone, moist / dry subzone	CWH lowland western hemlock - Amabilis fir zone, high precipitation variant, wet subzone
Lichen tree species				
western hemlock	****	****	-	*
western redcedar	*** modified variant	***	-	-
amabilis fir	* higher elevations	*** a	-	*
subalpine fir	***	-	**** higher elevations, also climaxes	****
Douglas-fir	*	*	-	**
Shrub species	climax and often seral Vaccinium spp., Rubus spp. * Gaultheria shallon, * Menziesia ferruginea	seral and climax Vaccinium spp., Rubus spp. Gaultheria shallon, Menziesia ferruginea, Rhododendron spp.	climax Juniperus spp. * Arctostaphylos spp.	seral and climax Vaccinium spp., Rubus spp. Gaultheria shallon, * Menziesia ferruginea
Herb species				
fern ex. bracken	-	**	-	-
Hylocomium splendens	***	**	****	**
Streptopus roseus	***	*	***	*
Clintonia uniflora	***	*	**	-
Linnaea borealis	**	**	**	*
Shrub life form species				
Black spruce	*	-	**	-
Mountain hemlock	*	-	*	-
Tree, shrub and herb species				
Engelmann spruce	*	***	-	*
subalpine fir	*	***	-	-
Abies lasiocarpa var. lasiocarpa	-	***	-	-
Picea engelmannii x glauca	*	****	-	*
Vaccinium spp.	****	****	*	** *
Rhododendron spp.	***	**	****	****
Valeriana sitchensis	-	-	-	***

TABLE 1. (cont'd)

Key:**** eldespread & dominant *** eldespread ** common * uncommon . rare - absent Vegetation characteristics	Biogeoclimatic zones and subzones			
	IDFdg Interior Douglas-fir - Ponderosa Pine Zone, Northwestern Transitional Subzone	CWHf Coastal Western Hemlock Zone, Northern Outer Maritime Subzone (west of IDFdg)	SBS Sub-boreal Spruce Zone (west of IDFdg)	ESSF Engelmann Spruce - Subalpine Fir Zone (high elevations above IDFdg)
Climax shrub and herb species (cont'd)				
Senecio triangularis	.	.	.	***
Veratrum viride	.	.	.	***
Artemisia arctica	-	.	.	***
Phyllodoce empetriformis	-	-	-	***
Cassiope mertensiana	-	-	-	***
Seral shrub and herb species				
Corylus cornuta	***(southern sections)	-	-	-
Rosa nutkana	**	***	-	-
Physocarpus capitatus	*(*)	***	-	-
Epilobium angustifolium	**	***	.	-
Rosa gymnocarpa	***(especially in southern sections)	.	.	.
Rosa acicularis		*	***	.
Shepherdia canadensis	***(" " ")	.	***	.
Lathyrus nevadensis	***(" " ")	.	***	.
Rubus pubescens	***(" " ")	.	***	.
Vaccinium caespitosum	***(" " ")	.	***	.
Chrysopsis villosa, V. pumila	***(" " ")	.	***	.
Mosses and liverworts				
Rhytidiadelphus loreus	.	****		
Pleurozium schreberi	*(*)	***	-	.
Scapania bolanderi	.	***	-	.
Hypnum circinale	.	***	-	.
Rhytidiadelphus triquetrus	***(*)	**	-	.
Ptilium crista-castrensis	***	.	**	.
Dicranum spp.	**	.	****	**
Plagiothecium spp.	****	.	**	***(*)
Rhytidiopsis robusta	**	****	***(*)	*(*)
		***	.	**(*)

TABLE 2. Synopsis of the biogeoclimatic variants of the ICHg

Characteristics	ICHg1 (Upper Nass Basin) Variant	ICHg2 (Lower Nass Basin) Variant	ICHg3 (Meziadin - Bell-Irving) Variant	ICHg4 (Kwinageese - Kiteen) Variant
Geographic Distribution	Nass River; Meziadin Junction - Meziadin Lake; Bell-Irving R. - Ambergris Cr.; upper Kwinageese and Kiteen rivers above 1,000 m in Southeast.	Nass River Valley; Cranberry Junction - Terrace Mt., sub-elevation (mid above 600 m, generally 1,000').	Meziadin Valley (lower Kwinageese R., Cranberry Cr. - Meziadin Lake); lower Bell-Irving, Damdochax, Kiteen, Kwinageese, and Cranberry rivers.	Kiteen River and Kwinageese drainages east of the crest of the Coast Mountains.
Elevation Range (m)	1,000-1,200 m in Nass Valley; 900-1,000 m in Southeast.	1,000-1,200 m; 900-1,000 m in Nass Valley; 800-900 m in Southeast.	1,000-1,200 m.	1,000-1,200 m.
Climate	Cool, moist, longer and more severe winters, moderately heavy mid- to late-winter snow; short cool summer drought.	Cool, moist with moist snow in Nass Valley; harsher in Southeastern sections; moderately heavy mid- to late-winter snow; intermediate between ICHg1 and ICHg3 variants; moderate snowfall.	Western Stikine Dry, cool with light, dry snowpack; short frost-free period, cool and windy, summer wet, insufficient to fulfill temperature in cooler, high and summer drought.	Cool, moist, long, severe winters, generally wetter, less severe than ICHg1, heavy, mid- to late-winter snow; short cool summer drought.
Vegetation: Typical tree species	Hw, Cw, Ss, Sx, Ba, At, Pl, Ep, Yc, Lw.	Hw, Cw, Ss, Sx, At, Ba, Pl, Ep, Yc, Lw.	Ss, Sx, Cw, At, Ba, Pl, Ep, Yc, Lw.	Hw, Cw, Ss, Sx, Ba, At, Pl, Ep, Yc, Lw.
Seral Stands	Extensive valley in southern sections; dominantly Pl, Ss, Sx.	Frequent in Nass Valley, less common elsewhere; Pl, Ss, Sx, Cw, At, Ep.	Widespread and dominant. Extensive stands of At - Ep - Sxw/seral and other shrubs. Also Pl, Ss, Cw, and At.	Extensive valley bottom; Pl, Ss, Sx, At, Ep, Cw.
Zonal Plant Association	Hw - (Cw) - Sxw/Cla - Vaccinium ovalifolium - V. alaskaense - V. membranaceum - Rhytidiadelphus loreus - Hylocomium splendens - Pleurozium schreberi	Hw - (Cw) - Tsh/Cla - Oplopanax horridus - Cornus canadensis - Viola orbiculata - Hylocomium splendens - Pleurozium schreberi - Rhytidiadelphus triquetrus	Hw - (Cw, Ss) - Sxw - Hylocomium splendens - Rhytidiadelphus triquetrus - Pleurozium schreberi - Pellia (Tsle-epiphylla)	Hw - Sx - (Cw) - Tsh/Cla - Alaskaense - V. ovalifolium - V. membranaceum - Lysichitum americanum - Hylocomium splendens - Pleurozium schreberi - Pellia (Tsle-epiphylla)
Zonal Plant Association	Hw - (Ba) - Sxw/Cla - Vaccinium ovalifolium - V. alaskaense - V. membranaceum - Rhytidiadelphus loreus - Hylocomium splendens - Pleurozium schreberi	Hw - (Cw) - Tsh/Cla - Oplopanax horridus - Cornus canadensis - Viola orbiculata - Hylocomium splendens - Pellia (Tsle-epiphylla) - Pleurozium schreberi - Rhytidiadelphus triquetrus	Hw - (Cw, Ss) - Sxw - Hylocomium splendens - Rhytidiadelphus triquetrus - Pleurozium schreberi - Pellia (Tsle-epiphylla)	Hw - Sx - (Cw) - Tsh/Cla - Alaskaense - V. ovalifolium - V. membranaceum - Lysichitum americanum - Hylocomium splendens - Pleurozium schreberi - Pellia (Tsle-epiphylla)

TABLE 2. (cont'd)

Characteristics	IDAg1 Upper Mass Basin variant	IDAg2 Lower Mass Basin variant	IDAg3 Hazelton variant	IDAg4 Meziadin - Bell-Irving variant	IDAg5 Iskut - Stikine variant
Miscellaneous notes	(Ba phase): Ab - Ba - Vaccinium ovalifolium - V. membranaceum - Rubus pedatus - Hylocomium splendens	extensive moss carpets may cover even subhygric sites, especially in southeastern sections	climax Hw stands scarce except on north-facing slopes. Most stands contain seral remnants of Pl, Rubus parviflorus, Rosa acicularis, Amelanchier alnifolia, etc.	extensive areas of subhygric to hygric Bl - Se - Oplopanax horridus - Gymnocarpium dryopteris - Rhytidiadelphus spp.	extensive Se - Bl - (Hw) - Oplopanax horridus - Gymnocarpium dryopteris communities; abundant Act floodplain forests.
Understory vegetation features	Vaccinium alaskaense present; V. ovalifolium and Rubus pedatus abundant.	Vaccinium alaskaense, Rubus pedatus lacking; Vaccinium ovalifolium scattered on zonal sites.	Vaccinium alaskaense, V. ovalifolium, Rubus pedatus lacking on zonal sites.	Vaccinium alaskaense, V. ovalifolium, Rubus pedatus abundant.	Vaccinium alaskaense, V. ovalifolium, Rubus pedatus abundant.
Landforms: lower elevations (valley floors)	fluvial terraces and morainal blankets.	fluvial terraces and glaciofluvial outwash; minor morainal blankets.	extensive fluvial terraces and active floodplains; organic deposits.	fluvial terraces and morainal blankets.	extensive fluvial terraces and active floodplains; morainal blankets.
middle to upper elevations	morainal and/or colluvial veneers and blankets (Ba phase: colluvial veneers and blankets).	morainal and/or colluvial veneers and blankets.	morainal blankets and veneers.	morainal veneers and/or blankets; colluvial veneers on steepest slopes.	colluvial and morainal veneers and/or blankets.
Zonal Soils:	Orthic Humo-Ferric Podzols (Ba phase: Orthic Ferro-Humic Podzols).	Brunisolic Gray Luvisols; Podzolic Gray Luvisols; Orthic Humo-Ferric Podzols (minor).	Orthic Humo-Ferric Podzols; Podzolic Gray Luvisols.	Orthic Humo-Ferric Podzols.	Orthic Humo-Ferric Podzols.

1 Tree species symbols as in Appendix II.2.

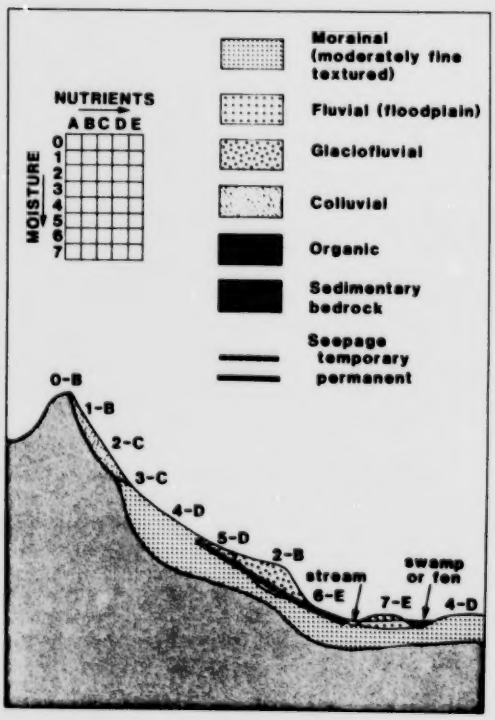


FIGURE 2. Generalized cross-section of edatopic positions.

position, slope, and aspect; soil texture and coarse fragments; humus form and thickness; depth to water table or mottling; and soil depth and rooting depth. Note the ecosystem indicated for this part of the edatopic grid. Figure 2 illustrates the schematic relationships among moisture and nutrient regimes along a typical slope profile.

(Steps 3 through 6 apply to each relatively uniform area identified in Steps 1 and 2)

Step 3.

Note the plant species on the site and their abundance.

Step 4.

Use the information from Steps 1, 2 and 3 to work through the ecosystem key for the subzone. Proceed to the indicated ecosystem. If this ecosystem encompasses the moisture and nutrient regimes indicated by Step 2, proceed to Step 5; if not, recheck your observations and attempt to obtain agreement. References to figures that depict the relative prominence of species in the various ecosystems may be helpful at this point.

Step 5.

Compare the site and its soil and vegetation with that summarized for the indicated ecosystem association (or subassociation, and phase if defined). If there is reasonable fit, proceed to Step 6; if not, record all pertinent data and discuss with regional ecology staff.

Step 6.

Consider the management interpretations suggested for the ecosystem. These are located on the pages facing the ecosystem descriptions. Modify as necessary to suit site-specific and stand-specific conditions.

3 BIOGEOCLIMATIC UNITS

The Interior Cedar - Hemlock Biogeoclimatic Zone (ICH) in the Prince Rupert Forest Region consists of one subzone, the ICHg or Northwestern Transitional Subzone.

The ICHg lies just east of the Coast Mountains in the drainages of the Skeena, Nass, Iskut, and Stikine rivers. It encompasses most of the Nass Basin physiographic subdivision and adjacent parts of the Skeena and Hazelton Mountains. Valley floors and lower to mid-mountain slopes ranging in elevation from 100 m to 1000 m are included within the ICHg. The ICHg occupies a transitional region that experiences elements of both coastal and interior climates. Western sections have a predominantly coastal-transitional climate, while eastern sections show dominantly continental or sub-boreal climatic influences. Precipitation, numbers of frost-free days, and winter temperatures all decrease significantly from west to east, while summer-time temperatures increase.

Elevational changes also profoundly influence regional climate and result in different biogeoclimatic units. In general, high elevation mountain slopes are cooler, more humid, and receive more snow than low elevation valley bottoms. However, because cold air drains downslope, creating temperature inversions, the greatest temperature extremes and heaviest frosts are often experienced on the valley floor, while mid-mountain slopes have a more equable climate.

The ICHg is bounded to the west by subzones of the Coastal Western Hemlock Zone (CWH) and to the east by the Sub-Boreal Spruce Zone (SBS). The Engelmann Spruce - Subalpine Fir Zone (ESSF) lies at subalpine elevations above the ICHg.

3.1 Distinguishing Floristic Features of the ICHg and Neighbouring Biogeoclimatic Units

The transitional nature of the ICHg climate is reflected in the vegetation of the subzone, which combines elements of both coastal and

interior flora. Climax forests are dominated by western hemlock,[1] which occurs together with subalpine fir, hybrid spruce, and western redcedar.

Fire has had a major influence on the development of many plant communities in the subzone. Seral (nonclimax) stands composed of lodgepole pine, trembling aspen, paper birch, hybrid spruce, and subalpine fir dominate lower elevations in many parts of the ICHg. Even older stands, approaching climax, usually contain remnant individuals of seral communities. Except in sheltered locations such as middle elevation valleys and some north-facing slopes, it is difficult to find a climax stand in the ICHg that has not been disturbed by fire within the past few centuries.

The CWHf (to the west of ICHg) has a coastal-transitional climate and is moister than the ICHg. The forests have a definite coastal character with widespread abundance of amabilis fir and scarcity of subalpine fir. The SBS Zone (to the east of the ICHg) has an interior continental climate and occupies the lower elevations adjacent to the ICHg Subzone. The SBS Zone lacks the coastal tree species such as western hemlock, western redcedar, and amabilis fir. Spruce and subalpine fir dominate most mature forests.

The ESSF Zone lies at subalpine elevations above the ICHg. Its lower elevational limits drop significantly as one proceeds from south to north. Vegetationally, the ESSF lacks western hemlock, western redcedar, and amabilis fir. It is also rich in herbaceous species.

Specific vegetation features that characterize the ICHg and can be used to distinguish it from neighbouring biogeoclimatic zones and subzones are listed in Table 1.

3.2 Synopsis of the Variants of the ICHg

Within the ICHg there is considerable climatic variation. This variation corresponds primarily to differences in longitude, latitude, elevation, and surrounding topography within the subzone. The climatic

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[1] Plant names used in the guide are listed in Appendix 1.

variation is strongly reflected in vegetation characteristics such as the distribution of tree species within the subzone, and patterns of plant communities in the landscape. The ICHg Subzone is divided into five distinct biogeoclimatic variants:

ICHg1: Upper Nass Basin Variant
ICHg2: Lower Nass Basin Variant
ICHg3: Hazelton Variant
ICHg4: Meziadin - Bell-Irving Variant
ICHg5: Iskut - Stikine Variant

Figure 3 shows the distribution of variants within the ICHg. General characteristics of the variants are summarized in Table 2. Figure 4 profile diagrams show the elevational sequence or stratification of the variants on typical mountain slopes in the Nass, Bulkley, and Skeena drainages.

3.2.1 ICHg1 - Upper Nass Basin Variant

The ICHg1 variant covers the undulating terrain that extends roughly north and east of Cranberry Junction, as well as some higher elevations in the southeastern part of the subzone. Hummocky glacial till deposits derived from sedimentary bedrock dominate the landscape. Elevation ranges from 300 to 950 m in the Nass Basin to 750 to 1100 m in the southeastern portion. The general climate is cool and moist with a shorter growing season than in the ICHg2 or ICHg3. The vegetation is mainly composed of mature western hemlock forests mixed with subalpine fir. Subalpine fir and hybrid spruce dominate on the low-lying, wetter sites. Amabilis fir is limited to southern portions of the variant but is under severe climatic stress and often grows poorly. Where Amabilis fir is found in this variant, it is considered the ICHg1a or Amabilis Fir Phase. Western redcedar is absent in the ICHg1, thus distinguishing the variant from the ICHg2 and ICHg3.

Seral stands are not extensive except in some areas along the Nass River and in the southern portions of the variant above the ICHg2 and 3. Lodgepole pine is the dominant seral species, with trembling aspen and paper birch common, especially on south-facing slopes.

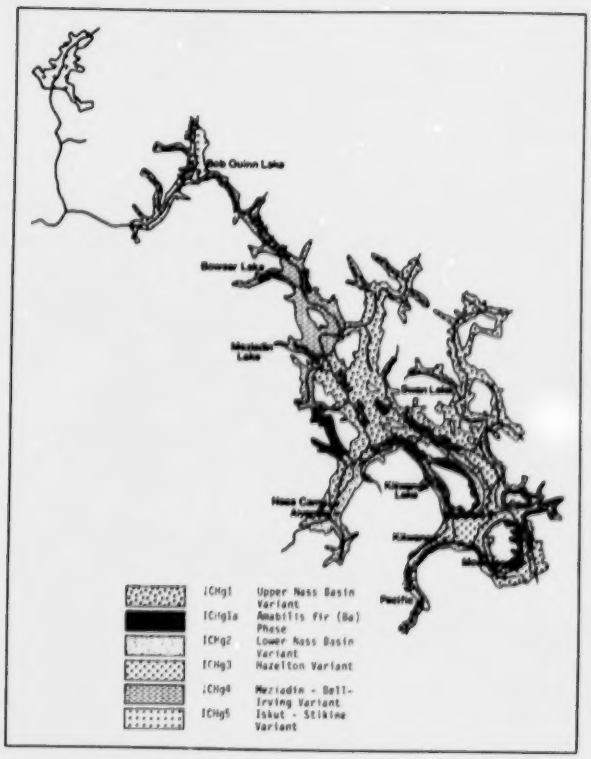


FIGURE 3. Biogeoclimatic Variants of the Interior Cedar - Hemlock Northwestern Transitional Subzone (ICHg).

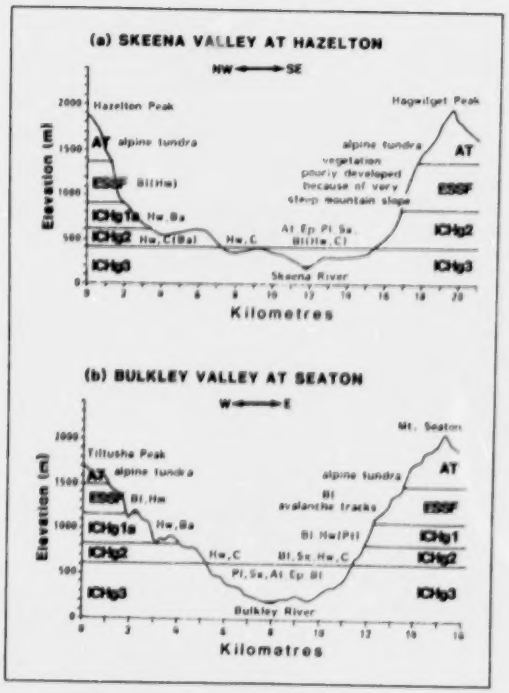


FIGURE 4a and b. Representative valley profiles showing distribution of biogeoclimatic units. Skeena Valley at Hazelton (a) and Bulkley Valley at Seaton (b).

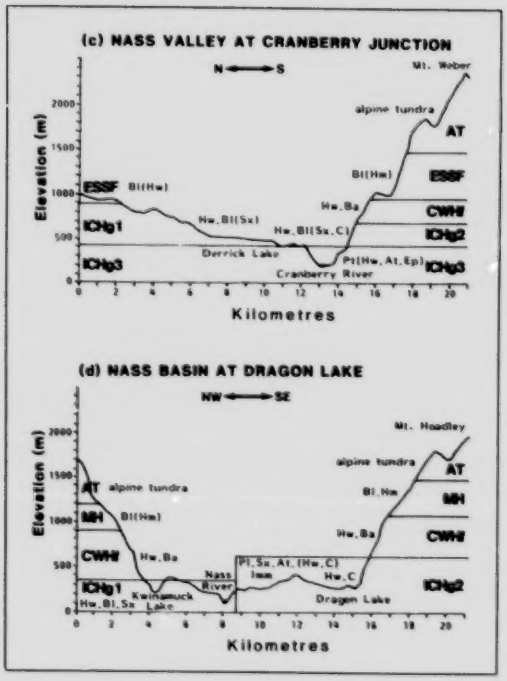


FIGURE 4c and d. Representative valley profiles showing distribution of biogeoclimatic units. Nass Valley at Cranberry Junction (c) and Nass Basin at Dragon Lake (d).

3.2.2 ICHgla - Upper Nass Basin Variant, Amabilis Fir Phase

On some northeastern slopes in the Nass Basin and in small sheltered valleys of the Rocher de Boule and Kispiox ranges, and between approximately 750 and 1100 m elevation, there exist enclaves of seemingly coastal forest of western hemlock and amabilis fir. Such areas are designated the ICHgla or Amabilis Fir Phase of the Upper Nass Basin Variant. The middle Kinskuch River valley has probably the largest concentration of the ICHgla. The ICHgla consists of old-growth stands that show no signs of past fire for many generations. Trees in the amabilis fir phase often reach coastal dimensions (amabilis fir and spruce between 45-50 m in height are not uncommon), and typically coastal understory species such as Rubus spectabilis and Rhytidiadelphus loreus are present. Soils are frequently Ferro-Humic Podzols and humus layers are unusually thick. In general, the ICHgla bears a very strong resemblance to higher elevation forests of the Coastal Western Hemlock biogeoclimatic zone.

3.2.3 ICHg2 - Lower Nass Basin Variant

The ICHg2 or Lower Nass Basin Variant is found in the Nass River valley from Cranberry Junction to the Tseax River valley, near Aiyansh. In the Nass drainage it ranges from the valley floor to an elevation of approximately 600 m. In the Skeena drainage, the ICHg2 occurs as a mid-elevation belt above the Hazelton (ICHg3) variant. The ICHg2 belt begins anywhere between 450 and 600 m in elevation and extends upslope to between 750 and 900 m. A discontinuous belt of ICHgl is found above the ICHg2 in southeastern sections of the subzone.

Climax forests in the ICHg2 are dominated by western hemlock and western redcedar, together with lesser amounts of subalpine fir and spruce. Amabilis fir is generally absent.

Seral stands are quite common at lower elevations in the ICHg2, particularly in the Nass valley. However, for the most part, they do not seem as firmly established as the extensive seral stands in the ICHg3. Most mature hemlock-cedar stands contain a few overmature individuals of lodgepole pine, paper birch, or trembling aspen, indicating a relatively recent fire origin.

3.2.4 ICHg3 - Hazelton Variant

The ICHg3 or Hazelton Variant is centred on the valley floor of the Skeena River between Tenas Hill and Legate Creek. Arms of the ICHg3 extend up major tributaries of the Skeena, including the Bulkley River below Trout Creek, the Kispiox River below Sweetin River, and the Kitwanga, Kitseguecla, and Suskwa river valleys. From the valley bottoms, the ICHg3 extends upslope to between 450 and 600 m in elevation.

West of Cedarvale the ICHg3 borders -- at its upper elevations -- on the Northern Drier Maritime subzone of the Coastal Western Hemlock Zone (CWHf). To the east, it is bounded at its upper elevations by the ICHg2.

The vegetation of the Hazelton Variant reflects the influence of frequent natural fire and widespread human disturbance. The ICHg3 may also be referred to as the aspen variant because of the extensive seral stands of trembling aspen and paper birch that have become established as a result of the fires and land clearing. These deciduous stands have dense shrub and herb layers and little or no moss on the forest floor. Corylus cornuta is characteristic of the Hazelton Variant. It is a dominant shrub within the variant and is rare or absent outside the ICHg3.

Lodgepole pine, spruce, and subalpine fir are the dominant coniferous tree species. In some areas of the ICHg3, stands bear a strong resemblance to those found in the Sub-Boreal Spruce Zone (SBS) because subalpine fir and spruce are the dominant species reproducing under the tree canopy.

Western hemlock and western redcedar are the true climatic climax tree species in the ICHg3, but their distribution is restricted. Small patches are scattered throughout the landscape and larger stands occur mainly on north-facing slopes and at the higher elevations.

There are few floristic criteria that can be used to distinguish climax stands of the ICHg3 from those of ICHg2 where the two variants occur one above the other on a mountain slope. Elevation and the relative abundance of successional stands are the two major criteria used to differentiate the variants in such areas.

3.2.5 ICHg4 - Meziadin - Bell-Irving Variant

The Meziadin - Bell-Irving Variant of the ICHg extends from the White River and Niska Lakes area, north along the Bell-Irving River to Ningunsaw Pass. It does not appear to extend east of the junction of the Nass and Bell-Irving rivers, nor into the main Nass Valley south of Meziadin Lake. The ICHg4 ranges in elevation from 240 m at Meziadin Lake to approximately 900-1000 m on some mountain slopes.

The ICHg4 can be referred to as a snowy variant because of the very large amounts of moist snow it receives. Normal maximum snowpacks are estimated at between 2.5 and 5 m in depth, well over twice the depth of that at equivalent elevations in the ICHg1.

Only preliminary studies have been completed in the ICHg4 to date, and therefore it is suggested that ecological descriptions for the ICHg1 be used until the classification is finished. However, the ICHg4 does have several distinct and unique characteristics.

The effects of heavy snowloads are apparent in patterns of vegetation found in the ICHg4. Western hemlock is the dominant tree species on mesic or zonal sites, but the occurrence of these well-drained upland sites is limited. A major portion of the landscape is occupied by poorly drained, low-lying sites or slopes receiving abundant seepage. Such sites are dominated by subalpine fir together with spruce, and contain very little hemlock. Subalpine fir grows exceptionally well in the ICHg4 and often reaches record size. It is obviously the tree species best adapted to growing conditions in the g4 variant. In association with the subalpine fir are understory layers dominated by Oplopanax horridus and Gymnocarpium dryopteris, which seem to extend from valley bottom to ridge top.

Western redcedar is absent from the ICHg4, while amabilis fir is common only in the Niska Lakes area at the southern end of the variant. Mountain hemlock, a species well adapted to heavy snow packs, is found at unusually low elevations in the ICHg4.

Fire appears to have had little influence on the development of vegetation in this variant. There are stands of trembling aspen on a few south-facing slopes but, in general, seral stands are of minor occurrence and subalpine fir is the most frequent pioneer tree. Lodgepole pine is especially uncommon; it seems to be poorly adapted to the ICHg4 climate.

Avalanches are the major disturbance factor in the ICHg4. Broad swaths of Alnus viridis ssp. sinuata and other pioneer species extend from upper mountain slopes into the valley bottoms and are a prominent visual feature of the ICHg4.

3.2.6 ICHg5 - Iskut - Stikine Variant

The ICHg5 Variant has received little study because of its remoteness. Based on existing information, the ICHg5 seems most similar to the ICHgl in its ecological characteristics.

The Iskut - Stikine Variant occupies low to medium elevations (150-900 m) in the central part of the Iskut and Stikine river valleys, east of the crest of the Coast Mountains. In the Iskut drainage, the ICHg5 extends from the lower Ningunsaw River and Durham-Ball creeks downstream to Snippaker Creek. The variant occurs in the Stikine drainage from Dokdaon Creek to just below the Scud River.

Western hemlock is the climatic climax species of the ICHg5 and forms extensive, old-growth, often "decadent" stands. Western redcedar is absent. Subalpine fir and hybrid Sitka x white spruce sometimes occur in mature forest on zonal sites; both species are abundant on moist rich sites and in areas of cold air drainage or ponding. Black cottonwood, along with the hybrid spruce, forms floodplain forests. Lodgepole pine, aspen, and paper birch are scattered, forming seral forests in burned-over areas, especially in the vicinity of Bob Quinn Lake.

4 THE ICHgl VARIANT

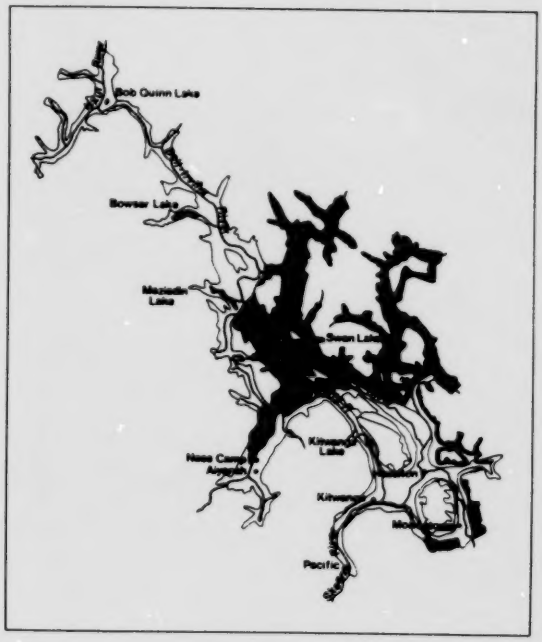


FIGURE 5. The Northwestern Transitional Interior Cedar - Hemlock Subzone, Upper Nass Basin Variant (ICHgl) in the Prince Rupert Forest Region.

4.1 Ecosystem Units of the ICHgl

/01 Zonal Hemlock - Moss ecosystem association

/01(1) Vaccinium variation

/02 Pine - Lichen ecosystem association

/03 Dry Hemlock - Moss ecosystem association

/04 Devil's Club - Oak Fern - Feathermoss ecosystem association

/05 Devil's Club - Fern - Leafy Moss ecosystem association

/06 Horsetail - (Skunk Cabbage) Swamp ecosystem association

Seral ecosystem association:

/07 Floodplain Cottonwood seral ecosystem association

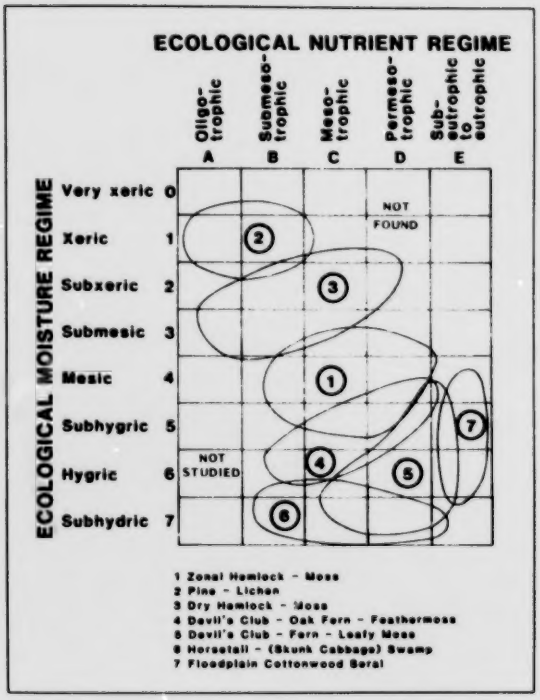


FIGURE 6. Edatopic grid of the ICHgl.

4.2 Seral Variations - ICHgl

Throughout much of the ICHgl, successional stands are either of minor occurrence or bear a strong resemblance to the climax condition. However, in some low elevation or southern portions of the variant, such as along the Nass River just north of Cranberry Junction and in the Kispiox Valley, seral stands are widespread.

The composition of these seral stands is highly variable. Tree cover is dominated by various combinations of lodgepole pine, subalpine fir, spruce, aspen, paper birch, or black cottonwood. Pine tends to dominate on sites belonging to the Pine - Lichen (ICHgl/02) and Dry Hemlock - Moss (ICHgl/03) ecosystem association, while moister ecosystems contain more deciduous species and spruce.

There is a general tendency for seral variations of a given ecosystem unit to have much better developed shrub and herb layers than the climax. The diversity of species is also greater because many light or nutrient-demanding plants are still present in seral vegetation. Typical shrubs include Rubus parviflorus, Amelanchier alnifolia, Shepherdia canadensis, Rosa acicularis, and Viburnum edule. Arnica cordifolia, Vaccinium caespitosum, Oryzopsis asperifolia, O. pungens, Rubus pubescens, Aralia nudicaulis, Lathyrus nevadensis, Smilacina stellata, and Osmorhiza chilensis are characteristic herbs of the seral stands.

In many stands, particularly those in the latter stages of succession, the successional trend is evident. Hemlock regeneration is common in understory layers, climax shrubs and herbs predominate, and a carpet of feathermosses may be the dominant feature of the forest floor. When stands of this nature are encountered in the field, classify them according to the expected climax ecosystem association and refer to the silvicultural interpretation for that ecosystem unit. Note, however, that the brush hazard of the site is often significantly increased because of the presence of deciduous trees and seral shrub species. Undesirable advance regeneration of subalpine fir may also be present and may create a regeneration problem after logging.

Other seral stands give no obvious indication of their successional trend. These are primarily stands with deciduous overstories, very dense shrub and herb layers, and little or no moss layer. Such seral stands are most common at the south end of the ICHg1, adjacent to the ICHg3. Cornus sericea or Corylus cornuta may be present in the shrub layer. When stands of this nature are encountered in the field, locate an appropriate ecosystem description of a seral ecosystem association in the ICHg3 Variant, and refer to the management interpretations for that ecosystem unit.

4.3 Key to Ecosystem Units of the ICHgl

A Ecosystems with moderate to poor tree growth ..... B

AA Ecosystems with good tree growth ..... G

B Equisetum spp. dominate herb layer

HORSETAIL - (SKUNK CABBAGE) SWAMP (ICHgl/06)

BB Equisetum spp. rare or lacking in herb layer C

C Pl dominates main canopy; upper slopes and ridge crests or dry terraces ..... D

D Moss layer dominated by lichens; Pl regeneration frequent

PINE - LICHEN (ICHgl/02)

DD Moss layer a mixture of lichens and mosses; Hw dominates regeneration

DRY HEMLOCK - MOSS (ICHgl/03)

CC Hw dominates main canopy; generally middle slope positions ..... E

E Dense canopy of small short trees; Sx rare or lacking; herb layer very poorly developed

DRY HEMLOCK - MOSS (ICHgl/03)

EE Moderately dense stands of small to medium-sized trees; Sx often present; herb layer poorly to moderately developed ..... F

F Shrub layers poorly developed

ZONAL HEMLOCK - MOSS (ICHgl/01)

FF Shrub layers well developed

ZONAL HEMLOCK - MOSS: VACCINIUM VARIATION [ICHgl/01(1)]

G Act dominates main canopy; floodplain islands and river bottomlands

FLOODPLAIN COTTONWOOD SERAL (ICHgl/07)

GG Act rare or lacking in main canopy; generally lower slope positions ..... H

H Herb layer dominated by ferns (Gymnocarpium, Dryopteris, and Athyrium); feathermosses confined to hummocks and decaying wood

DEVIL'S CLUB - FERN - LEAFY MOSS (ICHgl/05)

HH Athyrium and Dryopteris spp. rare or lacking; moderately well-developed feathermoss carpet

DEVIL'S CLUB - OAK FERN - FEATHERMOSS (ICHgl/04)

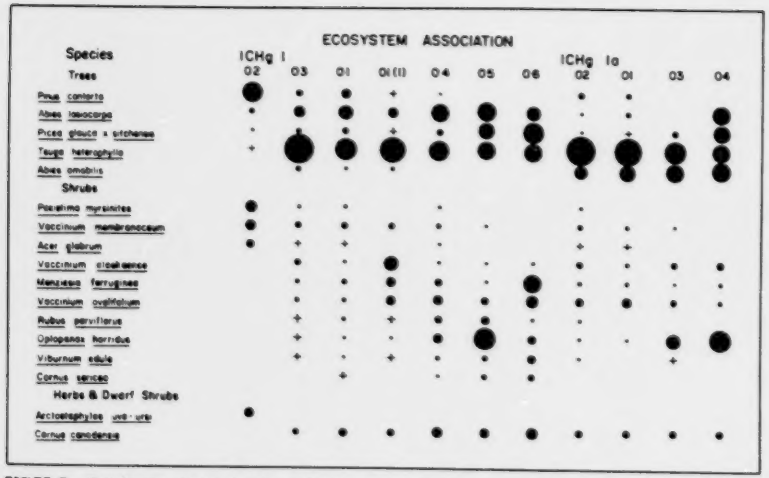


FIGURE 7. Prominence values for the major species of the ICHg1. Diameters of the circles are proportional to the prominance value, which is a measure of plant abundance incorporating both frequency and cover of the species in our sample plots. Prominance value = mean cover multiplied by the square root of freqency. + = trace.

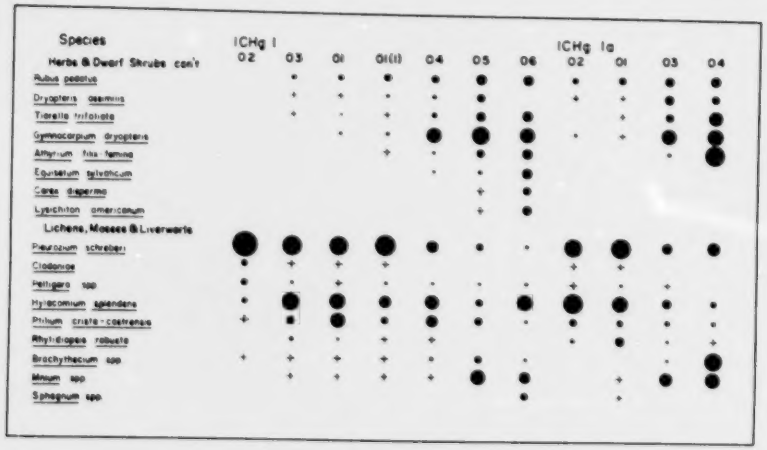


FIGURE 7. (cont'd)

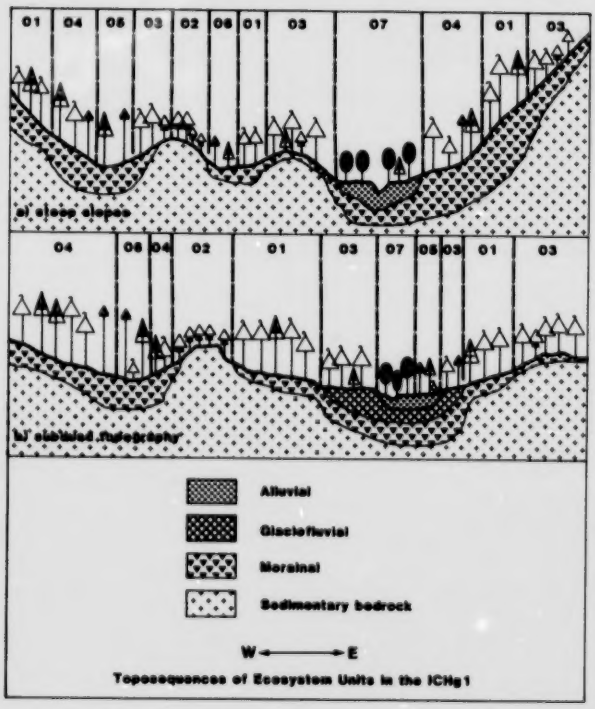


FIGURE 8. Toposequences of ecosystems in the ICHg1. Tree symbols as in Appendix 11.2.

TABLE 3. Habitat features of ecosystem units in the ICHgl

Habitat features	02	03	01	01(1)	04	05	06	07
Slope class	level to mod. sloping	level to mod. steep	gentle to mod. steep	gently rolling to mod. steep	gentle to mod. sloping	flat to gently sloping	level	level
Slope position	slope apices, terraces	upper, ridges	middle, lower	middle	middle, lower	lower, valley floors	depressions	valley floor
Soil parent materials[1]	RD,FG	M,FG,F	M,C,FG	M,C,FG	F,M,C	F,M	O	F
Soil texture[2]	LS	L,LS	L,LS	L	L,SL	SIL	CL	variable
Drainage class	rapid	well	mod. well	well	mod. well	well, imperfect	poor	well
Moisture regime	xeric	submesic	mesic	mesic	subhygric	hygric	subhydric	subhygric, hygric
Nutrient regime	submesotrophic	submesotrophic	mesotrophic	mesotrophic	permesotrophic	permesotrophic	mesotrophic	permesotrophic, eutrophic
Soil classification[3]	HFP, DYB, R	HFP, DYB	HFP	HFP	HFP	G, FGL	G, M	R
Humus form classification[4]	MOR	MOR	MOR	MOR	MOR	MOR, HUMM	HUMM, HYMM	MOR, HDR
Rooting depth (cm)	variable	>60	>50	30-50	variable	<35	10-20	>50
Thickness humus layer (cm)	5-5	4-10	5-15	5-11	5-30	5-20	>10	<5
Mineral soil pH (mean)	4.3	4.6	4.5	4.3	5.0	5.1	4.9	6.5
Humus pH (mean)	3.7	3.8	3.2	3.1	3.5	4.7	4.9	6.1

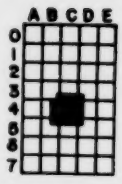
[1] Abbreviations of soil parent materials: C - colluvial; F - fluvial; FG - glaciofluvial; M - morainal; O - organic; RD - rock outcrop.
[2] Abbreviations of soil textures: CL - Clay loam; L - loam; LS - loamy sand; SL - sandy loam; SIL - silt loam.
[3] Abbreviations of soil orders/great groups: DYB - Dystric Brunisols; G - Gleysols; HFP - Humo-Ferric Podzols; M - Regosols; FGL - Fluvic Gleysols; R - Regosols.
[4] Abbreviations of humus form classification: MOR - Moders; HUMM - Humimors; HSMR - Mistimors; HYMR - Hydrimors; HDR - Rockers; MUM - Muimoders; AMR - Aeromors.

TABLE 4. Summary of silvicultural prescriptions and guidelines for the ICHgl

Ecosystem unit	Species choice		Primary method of establishment	Site preparation		Brush potential
	Preferred	Acceptable		Mech.	Burning	
/01 /01(1)	Sx, (Pl)	Pl, (Hw)	Planting	OK	OK	Low
/02	A V O I D	L O G G I N G				
/03	Pl	(Sx), (At)	Natural	OK	AVOID	Very low
/04	Sx	(Hw)	Planting	AVOID	(OK)	Moderate
/05	Sx	Pl, (Hw)	Planting	AVOID	OK	Moderate to severe
/06	Sx	(Bl)	Natural	AVOID	AVOID	Variable
/07	Sx	Act, (At)	Planting	AVOID	OK	Severe

4.5 Description and Interpretation of Ecosystem Units of the ICHgl

ZONAL HEMLOCK - MOSS (ICHgl/01)



SLOPE POSITIONS: Middle to lower.

SLOPE RANGE: Gentle to moderately steep.

ASPECT: All.

VEGETATION LAYERS[1]	SOILS
TREE: moderately dense stands of small to medium-sized trees. Hw (Bl) (Sxw)	TERRAIN/PARENT MATERIALS: Morainal blankets; some colluvial blankets; glaciofluvial deposits.
SHRUB: very poorly developed. (Vaccinium membranaceum) (Vaccinium ovalifolium) (Vaccinium alaskaense) (Menziesia ferruginea) (Oplopanax horridus)	SOIL NAME: Humo-Ferric Podzols.
	TEXTURE: Loam to loamy sand.
	DRAINAGE: Good.
HERB: poorly developed. (Cornus canadensis) (Rubus pedatus) (Orthilia secunda) (Clintonia uniflora) (Pyrola asarifolia) (Streptopus spp.)	HUMUS FORM: Hemimors.
	EFFECTIVE ROOTING: Deep; generally greater than 50 cm.
MOSS: a well-developed feather-moss carpet; good vigour. Hylocomium splendens Pleurozium schreberi Ptilium crista-castrensis (Brachythecium spp.)	OTHER FEATURES: Lithic contacts lacking in upper 100 cm of profile.

COMMENTS: This association represents the climatic climax for the ICHgl and is widespread throughout the variant, especially at the lower elevations. Vegetation differences between this ecosystem association and the Dry Hemlock - Moss e.a. (ICHgl/03) are subtle. The Zonal Hemlock - Moss e.a. generally has higher diversity and vigour of understory species.

[1] Parentheses indicate species that may have low cover or may not be consistently present.

ZONAL HEMLOCK - MOSS (ICHgl/01)

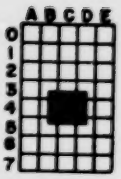
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sx, (Pl).
Acceptable	- Pl. - Hw, if area is unburned and humus is thicker than 10 cm.
Logging:	- summer or winter. - AVOID SCALPING.
Site preparation:	
Mechanical	- light mixing of humus with mineral soil may improve site, otherwise avoid. - DO NOT SCALP. - avoid excessive disturbance if aspen is prevalent.
Prescribed fire	- OK if humus is thicker than 10 cm or if advanced regeneration is unacceptable.
Brush hazard:	- low, unless there is a significant deciduous component in the mature stand. - ASSESS AT TIME OF SURVIVAL EXAMINATION.
Reforestation:	- PLANT SPRUCE, especially if advanced regeneration is unacceptable.
Other comments:	- species conversion to shade-intolerant spruce and/or pine is desirable.

ZONAL HEMLOCK - MOSS: VACCINIUM VARIATION (1CHg1/01(1))

SLOPE POSITIONS: Mid-slopes (generally).

SLOPE RANGE: Gently rolling to moderately steep.

ASPECT: All.



VEGETATION LAYERS	SOILS
TREE: stands usually not dense. Hw (Bl)	TERRAIN/PARENT MATERIALS: Morainal (colluvial) veneers and occasionally blankets; some glaciofluvial deposits.
SHRUB: usually well-developed. Vaccinium alaskaense Menziesia ferruginea Vaccinium ovalifolium Vaccinium membranaceum	SOIL NAME: Humo-Ferric Podzols; (Gleyed Podzolic Gray Luvisols).
HERB: sparse to moderately well developed. Cornus canadensis Rubus pedatus Orthilia secunda (Lycopodium annotinum) (Pyrola asarifolia) (Linnaea borealis)	TEXTURE: Loam to sandy loam.
	DRAINAGE: Good.
	HUMUS FORM: Hemimors.
MOSS: a well-developed, continuous carpet of feathermosses. Pleurozium schreberi Hylocomium splendens Ptilium crista-castrensis Brachythecium spp. Barbilophozia spp.	EFFECTIVE ROOTING: Shallow (30-50 cm). OTHER FEATURES: Shallow soils with bedrock commonly within 60 cm of surface.

COMMENTS: Widespread in the upper Kispiox and Kwinageese river valleys; sporadic and mainly at higher elevations in other parts of the ICHg1.

ZONAL HEMLOCK - MOSS: VACCINIUM VARIATION [ICHg1/01(1)]

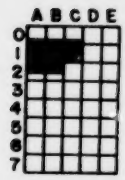
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sx, (Pl).
Acceptable	- Pl. - Hw, if area is unburned and humus is thicker than 10 cm.
Logging:	- summer or winter.
Site preparation:	
Mechanical	- light mixing of humus with mineral soil may improve site, otherwise avoid. - DO NOT SCALP. - avoid excessive disturbance if aspen is prevalent.
Prescribed fire	- OK if humus is thicker than 10 cm or if advanced regeneration is unacceptable.
Brush hazard:	- low, unless there is a significant deciduous component in the mature stand. - ASSESS AT TIME OF SURVIVAL EXAMINATION.
Reforestation:	- PLANT SPRUCE, especially if advanced regeneration is unacceptable.
Other comments:	- species conversion to shade-intolerant spruce and/or pine is desirable.

PINE - LICHEN (ICHg1/02)

SLOPE POSITIONS: Slope apices and ridge crests; terraces.

SLOPE RANGE: Level to moderately sloping.

ASPECT: All.



VEGETATION LAYERS	SOILS
TREE: small trees of low vigour; spacing open to quite dense. Pl	TERRAIN/PARENT MATERIALS: Rock outcrops; glaciofluvial outwash terraces, eskers.
SHRUB: low-lying, poorly to moderately developed. (Vaccinium membranaceum) (Salix scouleriana) (Amelanchier alnifolia) (Shepherdia canadensis) (Rosa acicularis)	SOIL NAME: Orthic Humo-Ferric Podzols with minor Eluviated Dystric Brunisols.
	TEXTURE: Loamy sand.
HERB: poorly to moderately well developed. Vaccinium caespitosum Arctostaphylos uva-ursi Melampyrum lineare Chimaphila umbellata Festuca occidentalis Oryzopsis asperifolia Oryzopsis pungens Hieracium albiflorum	DRAINAGE: Rapid.
	HUMUS FORM: Xeromors; Hemimors.
	EFFECTIVE ROOTING: Shallow on lithic sites; deep in glaciofluvial materials.
	OTHER FEATURES: Very thin organic horizons with little water-holding capacity.
MOSS: a mixture of mosses and lichens. Pleurozium schreberi Cladina spp. Peltigera spp. Cladonia spp. Stereocaulon spp. (Polytrichum juniperinum)	

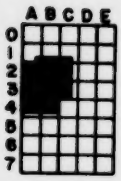
COMMENTS: This association has a very limited distribution in the ICHg1 and is unimportant for forest management.

PINE - LICHEN (ICHgl/02)

ACTIVITY OR CONCERN
AVOID LOGGING

These ecosystems are submarginal for timber production. If tney are included within larger openings, then consider their harvesting as timber mining.

DRY HEMLOCK - MOSS (ICHgl/03)



SLOPE POSITIONS: Upper slopes and ridge crests; some terraces and benches.

SLOPE RANGE: Level to moderately steep (0-45%).

ASPECT: All.

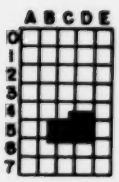
VEGETATION LAYERS	SOILS
TREE: canopy usually dense, formed by small, short trees. Hw (Pl) (Bl)	TERRAIN/PARENT MATERIALS: Morainal (colluvial) veneers over bedrock; some morainal blankets; coarse-textured glaciofluvial and fluvial deposits.
SHRUB: very poorly developed. (Vaccinium membranaceum) (Vaccinium ovalifolium) (Vaccinium alaskaense) (Menziesia ferruginea) (Paxistima myrsinites)	SOIL NAME: Orthic Humo-Ferric Podzols; Eluviated Dystric Brunisols.
HERB: very poorly developed. (Chimaphila umbellata) (Goodyera oblongifolia) (Cornus canadensis) (Orthilia secunda) (Rubus pedatus) (Linnaea borealis)	TEXTURE: Loam to loamy sand.
	DRAINAGE: Good.
	HUMUS FORM: Hemimors.
MOSS: a well-developed solid carpet of feathermosses. Pleurozium schreberi Hylocomium splendens (Ptilium crista-castrensis)	EFFECTIVE ROOTING: Variable, greater than 60 cm on glaciofluvial materials; on bedrock-controlled sites up to lithic contact.
	OTHER FEATURES: Organic materials generally weakly decomposed.

COMMENTS: Widespread throughout the ICHgl, especially at lower elevations. Productivity of trees lower than in the Zonal Hemlock - Moss e.a.

DRY HEMLOCK - MOSS (ICHg1/03)

ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Pl.
Acceptable	- (Sx). - a minor component of deciduous trees may improve site through litterfall and partial shading.
Logging:	- SIZE OF OPENING AND METHOD AND SEASON OF LOGGING CAN BE ADJUSTED TO PROMOTE NATURAL SEEDING WHERE APPROPRIATE.
Site preparation:	
Mechanical	- light mixing of humus with mineral soil may improve site.
Prescribed fire	- DO NOT BURN. - if humus is thicker than 15 cm consider a light burn to maintain or improve productivity. - coarse textured soil or shallow humus are particularly susceptible to degradation by fire.
Brush hazard	- very low to low. - deciduous trees occasionally may cause some problems.
Reforestation:	- plant Pl if required. - LOG TO PROMOTE Pl REGENERATION.
Other comments:	- where microclimatic extremes or difficulties in regeneration exist, and if stand structure permits, selective logging of merchantable stems may be preferred (assuming an acceptable residual stand).

DEVIL'S CLUB - OAK FERN - FEATHERMOSS (ICHg1/04)



SLOPE POSITIONS: Middle to lower slopes.

SLOPE RANGE: Gentle to moderately sloping.

ASPECT: All.

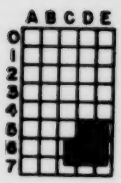
VEGETATION LAYERS	SOILS
TREE: stands relatively open; irregular canopies. Hw Bl Sx	TERRAIN/PARENT MATERIALS: Fluvial (glaciofluvial) deposits; morainal and colluvial blankets, often washed.
SHRUB: moderately well-developed. Oplopanax horridus Ribes lacustre Vaccinium ovalifolium Vaccinium membranaceum Menziesia ferruginea	SOIL NAME: Orthic and Gleyed Humo-Ferric Podzols.
	TEXTURE: Loam to sandy loam.
	DRAINAGE: Good to imperfect.
HERB: moderately to well-developed. Gymnocarpium dryopteris Tiarella spp. Cornus canadensis Rubus pedatus Orthilia secunda Clintonia uniflora (Streptopus spp.)	HUMUS FORM: Hemimors; Mormoders.
	EFFECTIVE ROOTING: Deep (greater than 60 cm).
MOSS: moderately well-developed feathermoss carpet. Hylocomium splendens Ptilium crista-castrensis Pleurozium schreberi (Rhytidiadelphus triquetrus)	OTHER FEATURES: Seepage often found at depth (greater than 40 cm below the mineral surface).

COMMENTS: Widespread, but less extensive and more localized than the Zonal Hemlock - Moss e.a. Subalpine fir and spruce are more important than in the Zonal Hemlock - Moss e.a.

DEVIL'S CLUB - OAK FERN - FEATHERMOSS (ICHg1/04)

ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sx.
Acceptable	- (Hw).
Logging:	- avoid deep gouging on finer textured soils to minimize seepage surfacing.
Site preparation:	
Mechanical	- AVOID, because disturbance may aggravate brush problem.
Prescribed fire	- OK EXCEPT ON SHALLOW SOILS. - when organic horizons are thicker than 15 cm, burning may improve site productivity. - unlikely to cause serious degradation.
Brush hazard:	- moderate; birch and/or aspen may be a problem. - ASSESS DURING FIRST SURVIVAL ASSESSMENT.
Reforestation	- PLANT IMMEDIATELY TO Sx.
Other comments:	- spruce weevil may cause serious damage and may require favouring species other than spruce.

DEVIL'S CLUB - FERN - LEAFY MOSS (ICHgl/05)



SLOPE POSITIONS: Lower to toe slopes, valley floors (depressions).

SLOPE RANGE: Flat to gently sloping (0-20%).

ASPECT: All.

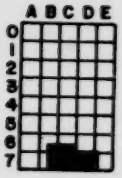
VEGETATION LAYERS	SOILS
TREE: stands open; canopies irregular. Bl Sx (Hw)	TERRAIN/PARENT MATERIALS: Fluvial or washed morainal.
SHRUB: well-developed. Oplopanax horridus Ribes lacustre Vaccinium ovalifolium Cornus sericea Viburnum edule Rubus parviflorus	SOIL NAME: Orthic Gleysols.
HERB: well-developed, lush. Gymnocarpium dryopteris Dryopteris assimilis Athyrium filix-femina Tiarella spp. Streptopus spp.	TEXTURE: Silt loam.
MOSS: poorly developed. Mnium spp. Brachythecium spp.	DRAINAGE: Good to imperfect.
	HUMUS FORM: Mormoders; Hemihumimors.
	EFFECTIVE ROOTING: Shallow (less than 35 cm).
	OTHER FEATURES: All soils relatively rich, and very moist to wet for most of the growing season.

COMMENTS: A very productive e.a. for spruce and subalpine fir. Such ecosystems are common in the ICHgl, but stands are rarely of large extent. The predominance of spruce and subalpine fir and heavy cover of Oplopanax horridus distinguish this association from the less rich Devil's Club - Oak Fern - Feathermoss e.a.

DEVIL'S CLUB - FERN - LEAFY MOSS (ICHg1/05)

ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sx.
Acceptable	- Pl, (Hw).
Logging:	- WINTER LOG IN ORDER TO MINIMIZE DISTURBANCE.
Site preparation:	
Mechanical	- AVOID, because of fine soil textures, wetness of site, and brush hazard.
Prescribed fire	- preferred for planter access but often difficult to obtain an acceptable burn due to wetness of site and rapid brushing-in.
Brush hazard	- moderate to severe; depends on abundance in stand before logging and degree of disturbance - birch occasionally pose a severe problem.
Reforestation:	- PLANT IMMEDIATELY WITH Sx, especially on high spots.
Other comments:	- ASSESS NEED AND URGENCY OF BRUSHING AND WEEDING AT TIME OF PLANTING. - spruce weevil may attack spruce. - PLAN ALL TREATMENTS NECESSARY TO ENSURE ESTABLISHMENT, since timing is critical if brush is to be controlled.

HORSETAIL - (SKUNK CABBAGE) SWAMP (ICHgl/06)



SLOPE POSITIONS: Depressions on valley floors or slope benches.

SLOPE RANGE: Level.

ASPECT: Flat.

VEGETATION LAYERS	SOILS
TREE: stocking irregular, many stand openings. Bl Sx (Hw)	TERRAIN/PARENT MATERIALS: Organic veneers over fluvial, lacustrine, or morainal deposits.
SHRUB: cover variable, well-developed in openings. Alnus incana ssp. tenuifolia Lonicera involucrata Viburnum edule Cornus sericea	SOIL NAME: Orthic Gleysols; Terric Mesisols.
HERB: well-developed. Equisetum arvense Equisetum pratense Equisetum sylvaticum Lysichiton americanum Athyrium filix-femina Gymnocarpium dryopteris Tiarella spp.	TEXTURE: Organic to clay loams. DRAINAGE: Poor. HUMUS FORM: Histomors; Hydromors.
MOSS: variable but generally well-developed. Hylocomium splendens Mnium spp. (Sphagnum spp.)	EFFECTIVE ROOTING: Shallow, 10-20 cm. OTHER FEATURES: Thick, wet organic layers cover the soil surface.

COMMENTS: This e.a. is found throughout the ICHgl at low elevations, but is localized in small pockets. Tree growth is restricted because of the high water table and poor soil aeration.

HORSETAIL - (SKUNK CABBAGE) SWAMP (ICHgl/06)

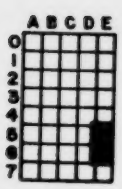
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sx.
Acceptable	- (Bl).
Logging:	- WINTER LOG OR DURING DRIEST PARTS OF SUMMER. - DO NOT DESTROY MOUNDS. - AVOID LOGGING POORER EXAMPLES OF THESE UNITS. - selective logging may be a viable alternative.
Site preparation:	
Mechanical	- AVOID.
Prescribed fire	- AVOID, it will reduce organic horizons. - consider planting chance before prescribing fire. - difficult to do a good job but could be used for species conversion.
Brush hazard:	- variable depending on drainage and richness of site. - control usually not required because of the open stand structure.
Reforestation:	- FILL-PLANT WITH Sx (MOUNDS ONLY).
Other comments:	- because of difficulty in fully realizing potential productivity of this unit (patchy stocking), all coniferous regeneration should be accepted.

FLOODPLAIN COTTONWOOD SERAL (ICHg1/07)

SLOPE POSITIONS: Valley floors.

SLOPE RANGE: Level (0-2%).

ASPECT: Flat.



VEGETATION LAYERS

TREE: very large, open grown trees.
Act
(Sx)
(Bl)

SHRUB: well-developed, very tall.
Cornus sericea
Alnus viridis ssp. sinuata
Alnus incana ssp. tenuifolia
Salix spp.
Viburnum edule
Lonicera involucrata
Rosa acicularis
Rosa nutkana

HERB: well-developed.
Equisetum arvense
Equisetum pratense
Equisetum hyemale
Gallium triflorum
Pyrola asarifolia
Circaea alpina
Athyrium filix-femina
Smilacina racemosa

MOSS: very poorly developed, generally absent except on decaying wood and tree bases.

SOILS

TERRAIN/PARENT MATERIAL:
Active fluvial (alluvial) sediments.

SOIL NAME:
Cumulic and Orthic Regosols.

TEXTURE:
Variable.

DRAINAGE:
Good to rapid.

HUMUS FORM:
Absent or thin Velomoders.

EFFECTIVE ROOTING:
Deep, greater than 60 cm.

OTHER FEATURES:
Very thin surface organic matter accumulations.

COMMENTS: This e.a. is common on floodplain islands and river bottomlands of the Nass, Skeena, and Kispiox rivers and a few of their major tributaries. These are very productive ecosystems, but coniferous trees are slow to establish after disturbance because of the intense competition from shrubs and herbs.

FLOODPLAIN - COTTONWOOD SERAL (ICHgl/07)

ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sx.
Acceptable	- Act, (At).
Logging:	- winter logging preferred.
Site preparation:	
Mechanical	- AVOID IF POSSIBLE. - consider only if a committed program of brush control is in place.
Prescribed fire	- OK but difficult because of poor distribution of slash and rapid brushing in, therefore timing is important.
Brush hazard:	- SEVERE (sometimes variable). - CONTROL REQUIRED, search for a cost-efficient method to re-establish a coniferous stand.
Reforestation:	- PLANT Sx IMMEDIATELY, preferably with large plug stock.
Other comments:	- PLAN ALL TREATMENTS NECESSARY TO ENSURE "FREE GROWING" CONIFERS; timing is critical if brush is to be controlled. - search for appropriate herbicides.

5 THE ICHgla PHASE

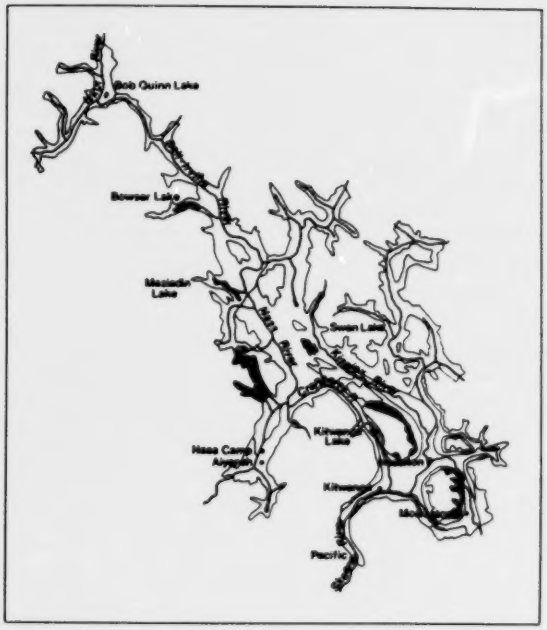


FIGURE 9. The Northwestern Transitional Interior Cedar - Hemlock Subzone, Upper Nass Basin Variant, Amabilis Fir Phase (ICHgla) in the Prince Rupert Forest Region.

5.1 Ecosystem Units of the ICHgla

/01 Zonal Hemlock - Amabilis Fir - (Vaccinium) - Moss ecosystem association
/02 Dry Hemlock - Moss ecosystem association
/03 Devil's Club - Oak Fern ecosystem association
/04 Devil's Club - Lady Fern - Oak Fern ecosystem association

5.2 Seral Variations - ICHgla

Successional stands are of very minor importance in this phase of the ICHgl Variant. Most stands are mature and overmature western hemlock forests. Where they do occur they are similar to those described for the ICHgl in general.

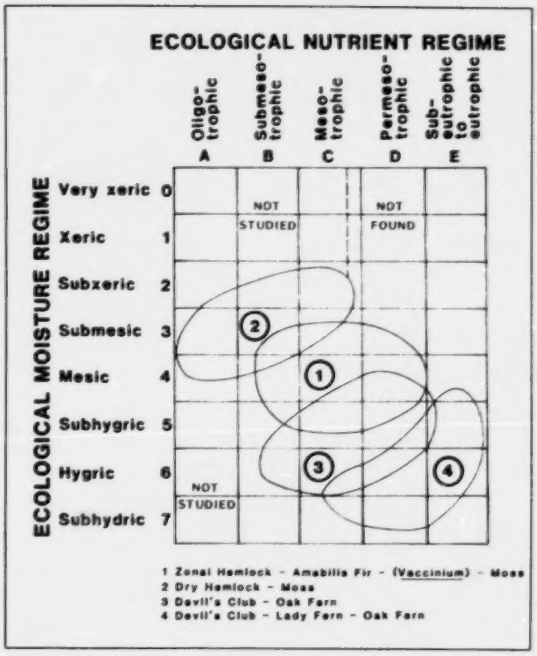


FIGURE 10. Edatopic grid of the ICHgla.

5.3 Key to Ecosystem Units of the ICHgla

A Ecosystems with Hw and Ba the main canopy components ..... B

AA Ecosystems with Ba and Bl the main canopy components; Hw common in the sub-canopy layers

DEVIL'S CLUB - LADY FERN - OAK FERN (ICHgla/04)

B Shrub layers with abundant advanced regeneration; generally middle or upper slope positions C

C Moss layer dominated by Hylocomium splendens; Sx often present

ZONAL HEMLOCK - AMABILIS FIR - (VACCINIUM) - MOSS (ICHgla/01)

CC Moss layer dominated by Pleurozium schreberi; Sx rare or lacking

DRY HEMLOCK - MOSS (ICHgla/02)

BB Shrub layers with little advanced regeneration; generally lower slopes receiving temporary seepage..... D

DEVIL'S CLUB - OAK FERN (ICHgla/03)

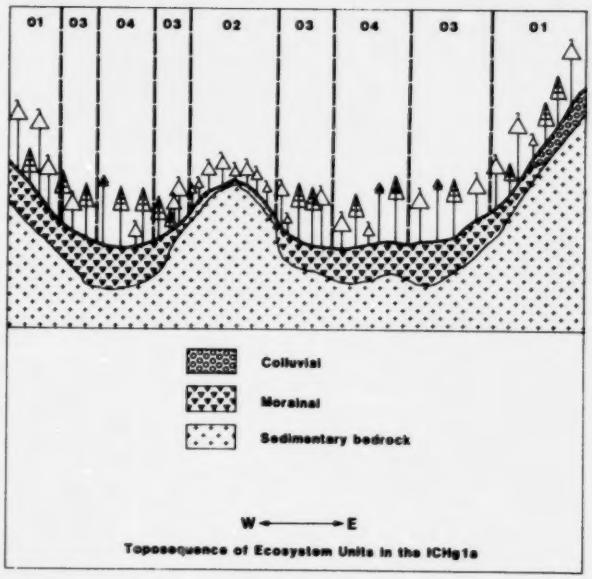


FIGURE 11. Toposequences of ecosystems in the ICHg1a. Tree symbols as in Appendix 11.2.

TABLE 5. Habitat features of ecosystem units in the ICHgla

Habitat features	02	01	03	04
Slope class	level to very steep	gentle to steep	level to steep	level to mod. sloping
Slope positions	upper, ridges	middle	middle, lower	lower, valleys
Soil parent materials[1]	C,M	C,M	M,C,F	F,C,M
Soil texture[2]	LS,SL	L,LS	LS,SL	SiL,L
Drainage class	well	well	well	imperfect, poor
Moisture regime	submesic	mesic	subhygric	hygric
Nutrient regime	submeso-trophic	meso-trophic	permeso-trophic	eutrophic
Soil classi-fication[3]	HFP, R	HFP, FHP	HFP, FHP	G
Humus form classification[4]	HMR	HMR	HMR	HMR, HHMR
Rooting depth (cm)	<70	--	--	<40
Thickness humus layer (cm)	<15	>20	4-6	7-18
Mineral soil pH (mean)	4.3	4.6	4.5	--
Humus pH (mean)	3.2	2.9	4.3	--

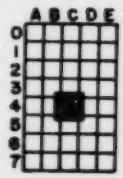
[1] Abbreviations of soil parent materials: C - colluvial; F - fluvial; M - morainal.
[2] Abbreviations of soil textures: L - loam; LS - loamy sand; SL - sandy loam; SiL - silt loam.
[3] Abbreviations of soil orders/great groups: FHP - Ferro-Humic Podzols; G - Gleysols; HFP - Humo-Ferric Podzols; R - Regosols.
[4] Abbreviations of humus form classification: HMR - Hemimors; HHMR - Hemihumimors; MMR - Mormoders.

TABLE 6. Summary of silvicultural prescriptions and guidelines for the ICHgla

Ecosystem unit	Species choice		Primary method of establishment	Site preparation		Brush potential
	Preferred	Acceptable		Mech.	Burning	
/01	Sx	Hw, Pl, (Ba)	Natural	AVOID	(OK)	Low
/02	Pl	(Hw), (Sx)	Planting	AVOID	AVOID	Very low
/03	Sx	Hw, Ba, (Cw)	Natural	AVOID	OK	Moderate to severe
/04	Sx	Ba, Cw, (Hw)	Planting	AVOID	OK	Severe

5.4 Description and Interpretation of Ecosystem Units of the ICHgla

ZONAL HEMLOCK - AMABILIS FIR - (VACCINIUM) - MOSS (ICHgla/01)



SLOPE POSITIONS: Mid-slopes.

SLOPE RANGE: Gentle to steep (10-70%).

ASPECT: All.

VEGETATION LAYERS[1]	SOILS
TREE: stands mostly overmature, all-aged. Hw Ba	TERRAIN/PARENT MATERIALS: Chiefly colluvial blankets; some morainal blankets.
SHRUB: poorly to well-developed; abundant advanced regeneration. Vaccinium ovalifolium Vaccinium membranaceum Menziesia ferruginea (Vaccinium alaskaense)	SOIL NAME: Humo-Ferric and Ferro-Humic Podzols.
HERB: poorly to moderately well-developed. Rubus pedatus Cornus canadensis Streptopus streptopoides Orthilia secunda Moneses uniflora	TEXTURE: Loam to loamy sand.
MOSS: a well-developed carpet. Hylocomium splendens Pleurozium schreberi Ptilium crista-castrensis Rhytidiopsis robusta (Rhytidiadelphus loreus)	DRAINAGE: Good.
	HUMUS FORM: Hemimors.
	EFFECTIVE ROOTING: Deep (greater than 60 cm).
	OTHER FEATURES: The coarse fragment content of these soils is high.

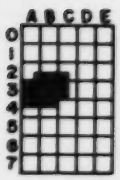
COMMENTS: This e.a. is widespread through the ICHgla, covering the major portion of the mountain slopes. This association is the climatic climax of the ICHgla, and is similar to climatic climax ecosystems found at montane elevations in the adjacent CWHf Subzone to the west of the ICHgla.

[1] Parentheses indicate species that may have low cover or may not be consistently present.

ZONAL HEMLOCK - AMABILIS FIR (VACCINIUM) - MOSS (IOHgla/01)

ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sx.
Acceptable	- Hw, Pl. - Ba; only on moister and richer examples of these units.
Logging:	- AVOID UNNECESSARY DISTURBANCE.
Site preparation:	
Mechanical	- AVOID TO PROTECT ACCEPTABLE ADVANCED REGENERATION. - usually not necessary.
Prescribed fire	- OK; planting required if burned.
Brush hazard:	- low (occasionally moderate). - Vaccinium may pose a problem to planters and initial growth of trees. - ASSESS NEED OF CONTROL AT TIME OF REGENERATION SURVEY.
Reforestation:	- IF REQUIRED FILL-PLANT WITH Sx OR Hw. - if burned, planting required but should be delayed several seasons to improve survival.
Other comments:	- Ba may slow down on drier, poorer, colder examples of this unit. - subsequent spacing control is usually required.

DRY HEMLOCK - MOSS (ICHgla/02)



SLOPE POSITIONS: Upper slopes and apices, ridge crests.

SLOPE RANGE: Level to very steep (0-70%+).

ASPECT: All.

VEGETATION LAYERS	SOILS
TREE: trees smaller than in zonal ecosystems. Hw (Ba)	TERRAIN/PARENT MATERIALS: Colluvial or morainal veneers over bedrock; occasionally coarse-textured glaciofluvial deposits.
SHRUB: poorly developed; dominantly coniferous regeneration. (Vaccinium membranaceum) (Menziesia ferruginea) (Vaccinium ovalifolium)	SOIL NAME: Orthic Humo-Ferric Podzols; Orthic Regosols.
HERB: poorly developed. (Cornus canadensis) (Orthilia secunda) (Streptopus streptopoides) (Rubus pedatus)	TEXTURE: Sandy loam to loamy sand.
MOSS: well-developed feather-moss carpet. Pleurozium schreberi Hylocomium splendens Ptilium crista-castrensis Rhytidiopsis robusta	DRAINAGE: Good to rapid.
	HUMUS FORM: Hemimors.
	EFFECTIVE ROOTING: Relatively deep (up to 70 cm).
	OTHER FEATURES: High coarse fragment content.

COMMENTS: The ICHgla/02 is found only on extreme sites in the ICHgla, generally in locations exposed to above-average sunlight and rapid drainage. This e.a. can be distinguished from the ICHgla/01 by the lack of a shrub layer and predominance of the moss, Pleurozium schreberi.

DRY HEMLOCK - MOSS (ICHgla/02)

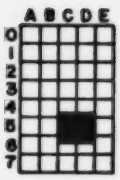
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Pl.
Acceptable	- (Hw), (Sx). - a minor component of aspen or birch may improve the site by promoting decomposition and incorporation of litter into soil.
Logging:	- 3-m knockdown to eliminate shade-tolerant-remnants of the understory. - AVOID EXCESSIVE GROUND DISTURBANCE.
Site preparation:	
Mechanical	- AVOID, particularly on steep slopes or shallow soil.
Prescribed fire	- DO NOT BURN. - if advanced regeneration is unacceptable and/or if organic horizons are thicker than 15 cm, consider a light burn (spring) to consume only the L horizon.
Brush hazard:	- very low.
Reforestation:	- PLANT WITH Pl.
Other comments:	- Ba, Cw, Hw, Sx unacceptable. - organic horizons are very beneficial for moisture retention.

DEVIL'S CLUB - OAK FERN (ICHgla/03)

SLOPE POSITIONS: Middle to lower slopes.

SLOPE RANGE: Level to steep.

ASPECT: All.



VEGETATION LAYERS	SOILS
TREE: all species growing well. Hw Ba (Sx)	TERRAIN/PARENT MATERIALS: Morainal and colluvial blankets; fluvial deposits.
SHRUB: moderately to well-developed. Oplopanax horridus Vaccinium ovalifolium Ribes lacustre	SOIL NAME: Orthic and Gleyed Humo-Ferric Podzols.
	TEXTURE: Loamy sand to sandy loam.
HERB: moderately developed; moderate species diversity. Gymnocarpium dryopteris Tiarella spp. Streptopus spp. Cornus canadensis Rubus pedatus	DRAINAGE: Good to imperfect.
	HUMUS FORM: Hemimors.
MOSS: moderately developed carpet of feathermosses; leafy mosses in depressions. Hylocomium splendens Ptilium crista-castrensis Pleurozium schreberi Mnium spp.	OTHER FEATURES: Mottling may occur in the lower soil horizons. Coarse fragment content generally greater than 40%.

COMMENTS: This e.a. is found throughout the ICHgla, and represents productive ecosystems for hemlock, amabilis fir, and spruce. Spruce is normally the largest tree in the stand.

DEVIL'S CLUB - OAK FERN (ICHgla/03)

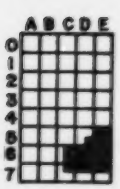
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sx.
Acceptable	- Hw, Ba, (Cw).
Logging:	- MINIMIZE SLASH PRODUCTION. - this unit often exists in complex with ICHgla/01 as hollows that typically collect slash. - MINIMIZE DISTURBANCE. - logging during wetter seasons increases site disturbance and brush encroachment. - 3-m knockdown.
Site preparation:	
Mechanical	- AVOID.
Prescribed fire	- OK, EXCEPT ON SHALLOW SOILS. - often unnecessary due to complexing with ICHgla/01.
Brush hazard:	- moderate to severe; depends on mature stand structure and amount of disturbance.
Reforestation:	- UTILIZE ACCEPTABLE Hw and Ba. - IF PLANTING IS REQUIRED DO SO IMMEDIATELY WITH Sx OR (Cw).
Other comments:	- assess need of brushing and weeding at time of first silvicultural survey.

DEVIL'S CLUB - LADY FERN - OAK FERN (ICHgla/04)

SLOPE POSITIONS: Valley floors, lower and toe slopes.

SLOPE RANGE: Level to moderately sloping (0-25%).

ASPECT: All.



VEGETATION LAYERS	SOILS
TREE: trees large, widely spaced. Ba Bl Hw Sx	TERRAIN/PARENT MATERIALS: Fluvial; colluvial and morainal deposits.
SHRUB: well-developed, tall. Oplopanax horridus Alnus lacustre (Vaccinium spp.) (Menziesia ferruginea) (Rubus spectabilis) (Sambucus racemosa)	SOIL NAME: Orthic Gleysols and Gleyed subgroups of Brunisols, Regosols, and Podzols.
	TEXTURE: Silt loam to loam.
	DRAINAGE: Imperfect to poor.
HERB: well-developed and diverse. Athyrium filix-femina Gymnocarpium dryopteris Dryopteris assimilis Tiarella spp. Streptopus spp.	HUMUS FORM: Mormoders; Hemihumimors.
	EFFECTIVE ROOTING: Shallow (less than 40 cm).
MOSS: dominated by leafy mosses and liverworts. Mnium spp. Brachythecium spp. (Barbilophozia spp.)	OTHER FEATURES: Seepage commonly found within 40 cm of the soil surface.

COMMENTS: This e.a. is found on permanent seepage sites throughout the ICHgla but always in small pockets. It represents the most productive ecosystems in the ICHgla. Small patches develop wherever drainage channels or depressions occur.

DEVIL'S CLUB - LADY FERN - OAK FERN (ICHgla/04)

ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sx.
Acceptable	- Ba, Cw. - Hw acceptable on humus mounds.
Logging:	- try to lay out these units as separate areas to facilitate speed and control of subsequent treatments. - avoid these ecosystems for road building and skid trails. - LOG DURING WINTER OR DRIER TIMES OF YEAR TO MINIMIZE DISTURBANCE.
Site preparation:	
Mechanical	- AVOID, because of fine soil textures, wetness, and brush hazard.
Prescribed fire	- RECOMMENDED, EXCEPT ON FRAGMENTAL OR SKELETAL SOILS. - often difficult to get a good burn due to wetness and brush.
Brush hazard:	- SEVERE; ASSESS NEED AND URGENCY OF CONTROL AT TIME OF PLANTING.
Reforestation:	- PLANT IMMEDIATELY WITH HEALTHY, STURDY STOCK (Sx). - plant on high spots if areas are wet.
Other comments:	- these units must be planned in detail and closely controlled to avoid brush problems and site degradation. TIMING IS CRITICAL. Winter logging followed by a spring burn will save a season. Frequent monitoring of plantation progress is necessary.

6 THE ICHg2 VARIANT

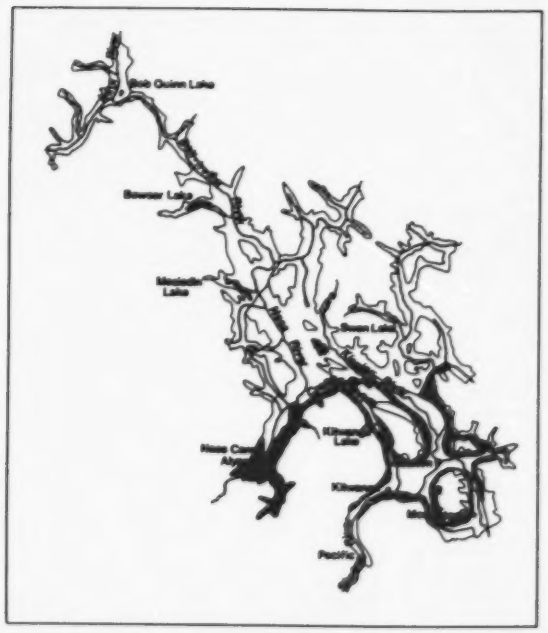


FIGURE 12. The Northwestern Transitional Interior Cedar - Hemlock Subzone, Lower Nass Basin Variant (ICHg2) in the Prince Rupert Forest Region.

6.1 Ecosystem Units of the ICHg2

/01 Zonal Hemlock - (Cedar) - Moss ecosystem association
/02 Pine - Lichen ecosystem association
/03 Dry Hemlock - Moss ecosystem association
/04 Devil's Club - Oak Fern - Feathermoss ecosystem association
/05 Devil's Club - Fern - Leafy Moss ecosystem association
/06 Horsetail Swamp ecosystem association
Seral ecosystem association:
/07 Floodplain Cottonwood Seral ecosystem association

6.2 Seral Variations - ICHg2

No detailed descriptions of seral variations for any of the ecosystem associations in the ICHg2 have been completed. Seral or successional stands are widespread at low elevations in the Nass Valley portion of the ICHg2. They are also present, but less common, in the Skeena-Bulkley Valley.

Many seral stands already bear a strong resemblance to the climax stand into which they will eventually develop. Such stands are easily assigned to one of the ecosystem associations described on the following pages. Management interpretations for the ecosystem unit should also apply well to these stands. Note, however, that the brush hazard of these sites is often significantly increased because of the presence of deciduous tree species and seral shrubs. Abundant advance regeneration of subalpine fir may also be present and may create regeneration problems after logging.

In the ICHg2, particularly near its border with the ICHg3, seral stands are encountered that give little indication of the kind of climax forest into which they will evolve. These are primarily stands with a heavy component of trembling aspen or paper birch in the overstory. They typically have very dense shrub and herb layers, dominated by species like

Cornus sericea, Rubus parviflorus, Corylus cornuta, Lathyrus nevadensis, Aralia nudicaulis, Smilacina stellata, and various species of grass. There is little or no moss layer. When you encounter a stand like this in the field, please refer to an appropriate seral ecosystem association description for the ICHg3 Variant, and follow the management guidelines for that unit.

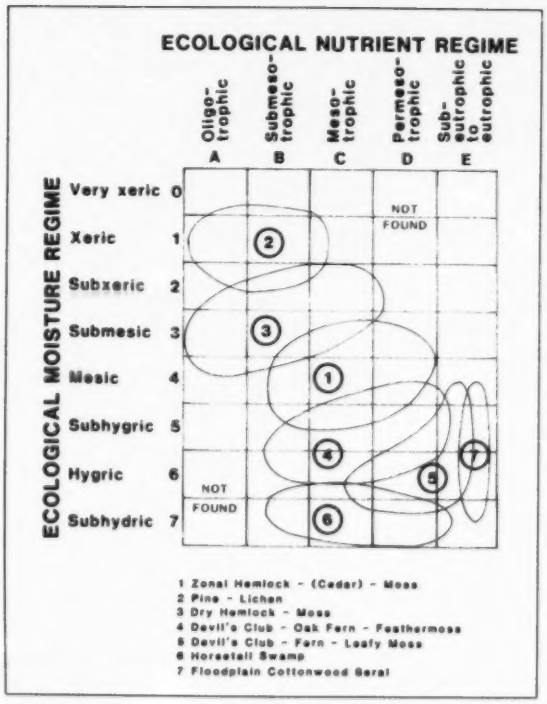


FIGURE 13. Edatopic grid of the ICHg2.

6.3 Key to Ecosystem Units of the ICHg2

A Ecosystems with moderate to poor tree growth ..... B

AA Ecosystems with good tree growth ..... G

B Equisetum spp. dominate herb layer

HORSETAIL SWAMP (ICHg2/06)

BB Equisetum spp. rare or lacking in herb layer C

C Pl dominates main canopy; upper slopes and ridge crests or dry terraces ..... D

D Moss layer dominated by lichens

PINE - LICHEN (ICHg2/02)

DD Moss layer a solid carpet of feathermosses

DRY HEMLOCK - MOSS (ICHg2/03)

CC Hw dominates main canopy; generally middle slope positions ..... E

E Moderately dense stands of small to medium - sized trees; Sx often present; herb layer poorly to moderately developed

ZONAL HEMLOCK - (CEDAR) - MOSS (ICHg2/01)

EE Dense canopy of small short trees; Sx rare or lacking; herb layer very poorly developed

DRY HEMLOCK - MOSS (ICHg2/03)

G Act dominates main canopy; floodplain islands and river bottomlands

FLOODPLAIN COTTONWOOD SERAL (ICHg2/07)

GG Act rare or lacking in main canopy; generally lower slope positions ..... H

H Herb layer dominated by ferns (Gymnocarpium, Dryopteris, and Athyrium); feathermosses confined to hummocks and decaying wood

DEVIL'S CLUB - FERN - LEAFY MOSS (ICHg2/05)

HH Athyrium and Dryopteris spp. rare or lacking; well-developed feathermoss carpet

DEVIL'S CLUB - OAK FERN - FEATHERMOSS (ICHg2/04)

6.4 Prominence of the Major Species of the ID4g2

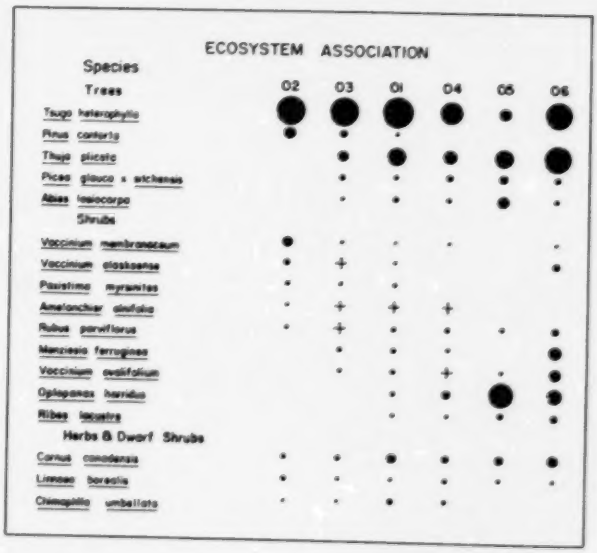


FIGURE 14. Prominence values for the major species of the ID4g2. Diameters of the circles are proportional to the prominance value, which is a measure of plant abundance incorporating both frequency and cover of the species in our sample plots. Prominance value = mean cover multiplied by the square root of freqency. + = trace.

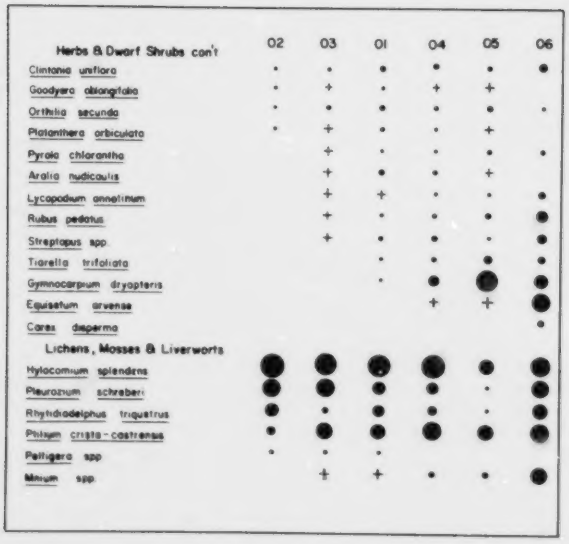


FIGURE 14. (cont'd)

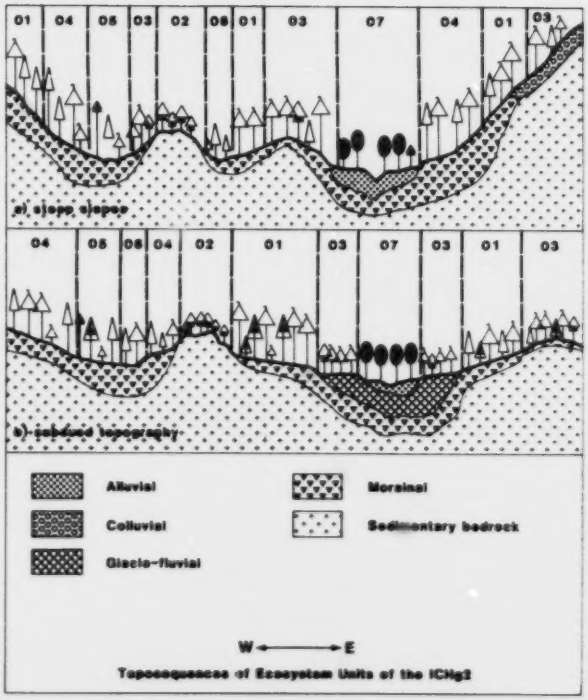


FIGURE 15. Toposequences of ecosystems in the ICHg2. Tree symbols as in Appendix 11.2.

TABLE 7. Habitat features of ecosystem units in the ICHg2

Habitat Features	02	03	01	04	05	06	07
Slope class	level to mod. sloping	level to very steep	gentle to mod. sloping	level to mod. steep	gently sloping to level	gently sloping to level	level
Slope positions	slope apices	upper, ridges	middle	lower, valleys	lower, valleys	valley floors, depressions	valley floors
Soil parent materials[1]	RO, FB	M, C, FB	M, C	M, C	M, F	O	F
Soil texture[2]	LS	L, SL	SL, SiL	SL, L	SiL, L	SiL, CL	variable
Drainage class	rapid	well	mod. well	well, imperfect	well, imperfect	poor	well, rapid
Moisture regime	xeric	submesic	mesic	subhygric	hygric	subhydric	subhygric, hygric
Nutrient regime	submesotrophic	submesotrophic	mesotrophic	permesotrophic	eutrophic	permesotrophic	permesotrophic, eutrophic
Soil classification[3]	HFP	HFP	GL	GL, HFP	O, EB	O, M	R
Humus form classification[4]	HAR	HAR	HAR	HAR, HAR	HAR, HAHR	HSR, HAR,	Absent, HAR
Rooting depth (cm)	<60	—	<30	<60	<60	<30	>60
Thickness humus layer (cm)	3-5	5-16	5-13	6-13	>15	>30	<5
Mineral soil pH (mean)	4.3	4.7	5.1	4.9	4.2	5.9	6.5
Humus pH (mean)	3.7	4.2	3.8	3.7	3.2	4.0	6.1

1 Abbreviations of soil parent materials: C - colluvial; F - fluvial; FB - glaciofluvial; M - morainal; O - organic; RO - rock outcrop.
2 Abbreviations of soil textures: CL - clay loam; L - loam; LS - loamy sand; SL - sandy loam; SiL - silt loam.
3 Abbreviations of soil orders/great groups: EB - Eutric Brunisols; G - Gleysols; GL - Gray Luvisols; HFP - Humo-Ferric Podzols; M - Mesisols; R - Regosols.
4 Abbreviations of humus form classification: HAR - Hemimors; HAHR - Hemihumimors; HSR - Histomoders; HAR - Humoders.

TABLE 8. Summary of silvicultural prescription and guidelines for the ICHg2

Ecosystem unit	Species choice		Primary method of establishment	Site preparation		Brush potential
	Preferred	Acceptable		Mech.	Burning	
/01	Sx	Pl,(Hw),(Cw)	Planting	AVOID	OK	Low
/02	A V O I D	L O G G I N G				
/03	Pl	(Sx), (At)	Natural	AVOID	AVOID	Low
/04	Sx, (Cw)	Hw, Pl, Cw (Ba)	Planting	AVOID	OK	Moderate
/05	Sx, Cw	Hw, (Ba)	Planting	AVOID	OK	Severe
/06	Sx, Cw	(Hw)	Natural	AVOID	AVOID	Variable
/07	Sx	Act, (At)	Planting	AVOID	OK	Severe

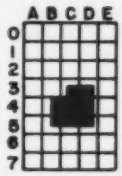
6.5 Description and Interpretation of Ecosystem Units of the ICHg2

ZONAL HEMLOCK - (CEDAR) - MOSS (ICHg2/01)

SLOPE POSITIONS: Middle (generally).

SLOPE RANGE: Gentle to moderately sloping.

ASPECT: All.



VEGETATION LAYERS[1]	SOILS
TREE: Hw Cw (Pl) (Sx) (Bl)	TERRAIN/PARENT MATERIALS: Morainal and colluvial blankets. SOIL NAME: Brunisolic and Podzolic Gray Luvisols.
SHRUB: very poorly developed; frequently absent. Vaccinium membranaceum Menziesia ferruginea Paxistima myrsinites	TEXTURE: Sandy loam to silt loams. DRAINAGE: Moderately good.
HERB: poorly to moderately well-developed. Chimaphila umbellata Cornus canadensis Orthilia secunda Clintonia uniflora Goodyera oblongifolia Aralia nudicaulis	HUMUS FORM: Hemimors. EFFECTIVE ROOTING: Shallow (less than 25 cm).
MOSS: well-developed except where heavy cover of Cw. Hylocomium splendens Ptilium crista-castrensis Rhytidiadelphus triquetrus Pleurozium schreberi	OTHER FEATURES: Compact, fine-textured subsurface horizons are common and can become impenetrable to tree roots.

COMMENTS: This e.a. is common and widely distributed throughout the ICHg2. Advanced regeneration of cedar and hemlock is common in the shrub layer.

[1] Parentheses indicate species that may have low cover or may not be consistently present.

ZONAL HEMLOCK - (CEDAR) - MOSS (ICHg2/01)

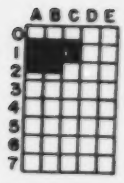
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sx.
Acceptable	- Pl. - Hw becomes acceptable at higher elevations and on northern aspects. - Cw acceptable only on moister, richer examples of this unit.
Logging:	- winter or summer. - protect acceptable advanced regeneration by minimizing disturbance. - 3-m knockdown to minimize mistletoe.
Site preparation:	
Mechanical	- AVOID.
Prescribed fire	- OK on deep humus (thicker than 15 cm), but avoid on steep slopes or sites with shallow humus. - light burn may be desired to eliminate unacceptable advanced regeneration.
Brush hazard:	- low, increases with disturbance. - assess need of treatment during survival examination. - when Vaccinium species dominate, planter access and seedling establishment will be hampered.
Reforestation:	- PLANT Sx OR Pl.
Other comments:	- establishment of spruce may be hindered by Pineus aphid.

PINE - LICHEN (ICHg2/02)

SLOPE POSITIONS: Slope apices and ridge crests, terraces.

SLOPE RANGE: Level to moderately sloping (0-25%).

ASPECT: All.



VEGETATION LAYERS

TREE: trees small, of low vigour; stands open to quite dense.
Pl

SHRUB: low-lying, poorly to moderately developed.
Vaccinium membranaceum
(Salix scouleriana)
(Amelanchier alnifolia)
(Shepherdia canadensis)
(Rosa acicularis)

HERB: poorly to moderately well-developed.
Arctostaphylus uva-ursi
Melampyrum lineare
Chimaphila umbellata
Festuca occidentalis
Oryzopsis asperifolia
Oryzopsis pungens
Hieracium albiflorum

MOSS: a mixture of mosses and lichens.
Pleurozium schreberi
Cladina spp.
Peltigera spp.
Cladonia spp.
Stereocaulon spp.
(Polytrichum juniperinum)

SOILS

TERRAIN/PARENT MATERIALS:
Rock outcrops; glaciofluvial outwash terraces, eskers.

SOIL NAME:
Humo-Ferric Podzols with minor Eluviated Dystric Brunisols.

TEXTURE:
Loamy sand.

DRAINAGE:
Rapid.

HUMUS FORM:
Xeromors; Hemimors.

EFFECTIVE ROOTING:
Shallow on lithic sites; deep in glaciofluvial deposits.

OTHER FEATURES:
Very thin organic horizons with little water-holding capacity.

COMMENTS: This e.a. has a very limited distribution in the ICHg2 and is unimportant for forest management.

PINE - LICHEN (ICHg2/02)

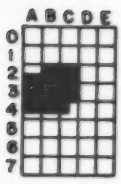
ACTIVITY OR CONCERN	
AVOID LOGGING	These ecosystems are submarginal for timber production. If they are included within larger openings, then consider their harvesting as timber mining.

DRY HEMLOCK - MOSS (ICHg2/03)

SLOPE POSITIONS: Upper slopes and ridge crests.

SLOPE RANGE: Level to very steep (0-75%+).

ASPECT: All.



VEGETATION LAYERS	SOILS
TREE: trees typically small; stands densely stocked. Hw Pl (Bl) (Cw)	TERRAIN/PARENT MATERIALS: Morainal and colluvial veneers and blankets; coarse-textured glaciofluvial deposits (kames).
SHRUB: very poorly developed. (Vaccinium membranaceum) (Menziesia ferruginea) (Amelanchier alnifolia) (Acer glabrum)	SOIL NAME: Humo-Ferric Podzols; minor Eluviated Dystric Brunisols.
HERB: very poorly developed. (Cornus canadensis) (Chimaphila umbellata) (Orthilia secunda) (Pyrola chlorantha) (Linnaea borealis) (Goodyera oblongifolia) (Platanthera orbiculata)	TEXTURE: Loam to sandy loam. DRAINAGE: Good. HUMUS FORM: Hemimors.
MOSS: generally a well-developed, solid carpet of feathermosses. Hylocomium splendens Pleurozium schreberi Ptilium crista-castrensis Rhytidiadelphus triquetrus	EFFECTIVE ROOTING: Variable, but usually greater than 60 cm. OTHER FEATURES: Generally high coarse fragment content; moisture deficits common during the growing season.

COMMENTS: The coarse soils and moisture-shedding slope positions create dry, nutrient-poor site conditions. Tree growth is generally poor. The understory species diversity and vigour of this e.a. are poorer than in the Zonal Hemlock - Moss e.a. (ICHg2/01), and stocking typically is denser.

DRY HEMLOCK - MOSS (ICHg2/03)

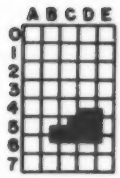
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Pl.
Acceptable	- (Sx). - minor component of aspen for site improvement. - use only local provenances due to variable serotiny in Pl cones.
Logging:	- ADJUST TO PROMOTE Pl REGENERATION.
Site preparation:	
Mechanical	- AVOID.
Prescribed fire	- DO NOT BURN, as organic horizons are very beneficial. - a light burn (spring) is acceptable if only L horizon is consumed.
Brush hazard:	- low.
Reforestation:	- if required, plant Pl.
Other comments:	- adjustments should be made to promote natural seeding-in of Pl.

DEVIL'S CLUB - OAK FERN - FEATHERMOSS (ICHg2/04)

SLOPE POSITIONS: Lower, valley floors.

SLOPE RANGE: Level to moderately steep.

ASPECT: All.



VEGETATION LAYERS	SOILS
TREE: Hw Cw (Sx) (Bl)	TERRAIN/PARENT MATERIALS: Morainal blankets; colluvial over morainal blankets; some fluvial deposits.
SHRUB: moderately well-developed. Oplopanax horridus (Ribes lacustre) (Rubus parviflorus) (Vaccinium membranaceum) (Menziesia ferruginea)	SOIL NAME: (Gleyed) Brunisolic Gray Luvisols; Humo-Ferric Podzols.
HERB: moderately well-developed. Gymnocarpium dryopteris Clintonia uniflora Cornus canadensis Orthilia secunda Pyrola chloranthe Linnaea borealis Tiarella spp. Streptopus amplexifolius	TEXTURE: Sandy loam to loam. DRAINAGE: Good to imperfect. HUMUS FORM: Hemimors; Mormoders. EFFECTIVE ROOTING: Shallow (less than 60 cm).
MOSS: well-developed carpet of feathermosses. Hylocomium splendens Pleurozium schreberi Ptilium crista-castrensis (Mnium spp.)	OTHER FEATURES: Low coarse fragment content with temporary seepage water within 60 cm of the soil surface.

COMMENTS: This e.a. is found throughout the ICHg2. All commercial tree species grow well, but spruce is usually the largest tree. Oplopanax horridus and Gymnocarpium dryopteris, the two primary indicator species, are often poorly developed in eastern sections of the ICHg2, where feathermosses may invade these ecosystems.

DEVIL'S CLUB - OAK FERN - FEATHERMOSS (iCHg2/04)

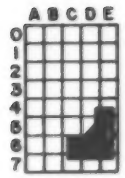
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sx, (Cw).
Acceptable	- Hw, Pl, Cw, Ba at high elevations in west.
Logging:	- minimize skid trails to reduce compaction of fine textured soils.
Site preparation:	
Mechanical	- AVOID.
Prescribed fire	- OK, EXCEPT ON SHALLOW SOILS. - burning may improve site productivity when organic horizons are thicker than 15 cm.
Brush hazard:	- variable (generally moderate), can be serious on skid trails. - ASSESS NEED OF BRUSH CONTROL DURING FIRST SURVIVAL SURVEY.
Reforestation:	- PLANT Sx (MINOR Cw).
Other comments:	- frost heaving of planted trees can occur on fine textured soils.

DEVIL'S CLUB - FERN - LEAFY MOSS (ICHg2/05)

SLOPE POSITIONS: Lower and toe slopes, valley floors; drainage channels.

SLOPE RANGE: Gently sloping or level.

ASPECT: All.



VEGETATION LAYERS	SOILS
TREE: trees large, widely spaced; canopy irregular. Sx Cw Hw (Act)	TERRAIN/PARENT MATERIALS: Morainal (colluvial) deposits; fluvial deposits.
SHRUB: usually well-developed, vigorous. Oplopanax horridus Ribes lacustre (Rubus parviflorus) (Viburnum edule)	SOIL NAME: Gleysols; Gleyed Eutric Brunisols.
	TEXTURE: Silt loam to loam.
	DRAINAGE: Good to imperfect.
HERB: well-developed, vigorous, moderately diverse. Gymnocarpium dryopteris Tiarella spp. Gallium triflorum Mitella nuda Circaea alpina Dryopteris assimilis Streptopus amplexifolius	HUMUS FORM: Mormoders; Hemihumimors.
	EFFECTIVE ROOTING: Relatively shallow (less than 60 cm).
MOSS: poorly to moderately well-developed; feathermosses confined to decaying wood and high spots. Mnium spp. Hylocomium splendens Ptilium crista-castrensis Brachythecium spp.	OTHER FEATURES: Seepage waters commonly occur within 30 cm of the mineral surface and promote abundant, shallow rooting.

COMMENTS: This e.a. is found throughout the ICHg2 but is generally localized in small pockets. These are very productive ecosystems for spruce, cedar, and subalpine fir. Hemlock is usually restricted to elevated microsites and decaying wood. This e.a. has a higher cover of feathermosses than analogous Devil's Club - Fern - Leafy Moss associations in the ICHg1 and g3 variants.

DEVIL'S CLUB - FERN - LEAFY MOSS (ICHg2/05)

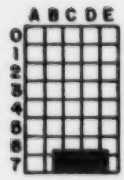
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sx, Cw.
Acceptable	- Hw; at higher elevations, Ba and Hw may be preferable.
Logging:	- WINTER LOG TO MINIMIZE DISTURBANCE.
Site preparation:	
Mechanical	- NOT RECOMMENDED, because of fine soil textures and wetness of site.
Prescribed fire	- OK, often difficult to get an acceptable burn due to wetness of site and brushing-in.
Brush hazard:	- moderate to severe; disturbance increases the deciduous component. - ASSESS NEED AND URGENCY OF BRUSH CONTROL AT TIME OF PLANTING.
Reforestation:	- PLANT Sx OR Cw IMMEDIATELY. - plant on high spots in wetter areas. - frost heaving may occur on drier areas.
Other comments	- these units must be planned in detail and closely controlled to avoid brush problems and site degradation. TIMING IS CRITICAL. Frequent monitoring of plantation progress is necessary.

HORSETAIL SWAMP (ICHg2/06)

SLOPE POSITIONS: Valley floors; depressions.

SLOPE RANGE: Gently sloping to level.

ASPECT: All.



VEGETATION LAYERS	SOILS
TREE: trees of variable size, normally short; canopy open and irregular. Cw Hw (Ss)	TERRAIN/PARENT MATERIALS: Organic veneers over morainal, fluvial, and lacustrine deposits.
SHRUB: generally well-developed but patchy. Menziesia ferruginea Vaccinium ovalifolium Cornus sericea Viburnum edule (Oplopanax horridus)	SOIL NAME: Gleysols and Humic Gleysols; Terric Mesisols. TEXTURE: Silt loam to clay loam.
HERB: well-developed and diverse. Equisetum arvense Equisetum pratense Equisetum sylvaticum Gymnocarpium dryopteris Carex disperma Tiarella trifoliata	DRAINAGE: Poor. HUMUS FORM: Histomoders; Mormoders.
MOSS: well-developed; diverse. Mnium spp. Hylocomium splendens Ptilium crista-castrensis Rhydiadelphus triquetrus Pleurozium schreberi (Sphagnum spp.)	EFFECTIVE ROOTING: Very shallow (less than 40 cm). OTHER FEATURES: Water table within 30 cm of the top of the organic horizons; mottles present in the mineral horizons.

COMMENTS: Tree productivity in this e.a. is extremely variable and depends on site nutrient status and degree of soil aeration.

HORSETAIL SWAMP (ICHg2/06)

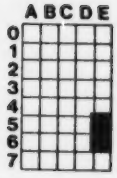
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sx, Cw.
Acceptable	- (Hw).
Logging:	- WINTER LOG OR DURING DRIEST PARTS OF SUMMER. - DO NOT DESTROY MOUNDS. - AVOID LOGGING POORER EXAMPLES OF THESE UNITS. - selective logging may be a viable alternative.
Site preparation:	
Mechanical	- AVOID.
Prescribed fire	- AVOID, it will reduce organic horizons. - consider planting chance before prescribing fire. - difficult to do a good job but could be used for species conversion.
Brush hazard:	- variable depending on drainage and richness of site. - usually not required due to open stand structure.
Reforestation:	- FILL-PLANT WITH Sx (MOUNDS ONLY).
Other comments:	- due to difficulty in fully realizing potential productivity of this unit (patchy stocking), all coniferous regeneration should be accepted.

FLOODPLAIN COTTONWOOD SERAL (ICHg2/07)

SLOPE POSITIONS: Valley floors.

SLOPE RANGE: Level (0-2%).

ASPECT: Flat.



VEGETATION LAYERS

TREE: trees very large, open grown.
Act
(Sx)
(Bl)

SHRUB: well-developed, very tall.
Cornus sericea
Alnus viridis ssp. sinuata
Alnus incana ssp. tenuifolia
Salix spp.
Viburnum edule
Lonicera involucrata
Rosa acicularis

HERB: well-developed.
Equisetum arvense
Equisetum pratense
Equisetum hyemale
Gallium triflorum
Pyrola asarifolia
Circaea alpina
Athyrium filix-femina
Smilacina racemosa

MOSS: very poorly developed, generally absent except on decaying wood and tree bases.

SOILS

TERRAIN/PARENT MATERIALS:
Active fluvial (alluvial) sediments.

SOIL NAME:
Cumulic and Orthic Regosols.

TEXTURE:
Variable.

DRAINAGE:
Good to rapid.

HUMUS FORM:
Absent or thin Velomoders.

EFFECTIVE ROOTING:
Deep, greater than 60 cm.

OTHER FEATURES:
Very thin surface organic matter accumulations.

COMMENTS: This e.a. is common on floodplain islands and river bottomlands of the Nass River and the lower reaches of its tributaries in the ICHg2. These are very productive ecosystems, but coniferous trees are slow to establish after disturbance because of the intense competition from shrubs and herbs.

FLOODPLAIN COTTONWOOD SERAL (ICHg2/07)

ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sx.
Acceptable	- Act, (At).
Logging:	- winter logging preferred.
Site preparation:	
Mechanical	- AVOID IF POSSIBLE. - consider only if a committed program of brush control is in place.
Prescribed fire	- OK, but difficult because of poor distribution of slash and rapid brushing-in; timing is important.
Brush hazard:	- SEVERE (sometimes variable). - CONTROL REQUIRED, search for a cost-efficient method to re-establish a coniferous stand.
Reforestation:	- PLANT Sx IMMEDIATELY, preferably with large plug stock.
Other comments:	- PLAN ALL TREATMENTS NECESSARY TO ENSURE "FREE GROWING" CONIFERS; timing is critical if brush is to be controlled. - search for appropriate herbicides.

7 THE ICHg3 VARIANT

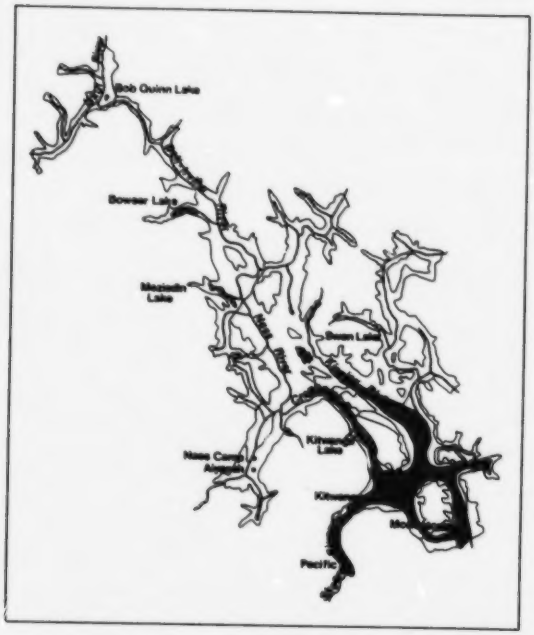


FIGURE 16. The Northwestern Transitional Interior Cedar - Hemlock Subzone, Hazelton Variant (ICHg3) in the Prince Rupert Forest Region.

7.1 Ecosystem Units of the ICHg3

/01 Zonal Hemlock - Moss ecosystem association
/01.1 Hemlock - (Cedar) subassociation
  /01.1(a) coarse textured phase
  /01.1(b) fine textured phase
/01.2 Subalpine Fir - Spruce subassociation
  /01.2(a) coarse textured phase
  /01.2(b) fine textured phase
/02 Pine - Lichen ecosystem association
/03 Dry Hemlock - Moss ecosystem association
  /03(a) lithic phase
  /03(b) coarse textured phase
/04 Devil's Club - Oak Fern - Feathermoss ecosystem association
  /04.1 Hemlock - Cedar subassociation
  /04.2 Spruce subassociation
/05 Devil's Club - Fern - Leafy Moss ecosystem association
/06 Horsetail - (Skunk Cabbage) Swamp ecosystem association
/07 Black Spruce - Sphagnum ecosystems

Seral ecosystem associations:

/08 Pine - Soopolallie seral ecosystem association
  /08(a) lithic phase
  /08(b) coarse textured phase
/09 Spruce - Pine - Shrub seral ecosystem association
  /09(a) coarse textured phase
  /09(b) fine textured phase
/10 Aspen - Birch - Red-osier Dogwood seral ecosystem association
  /10(a) hazelnut fluvial phase
/11 Floodplain Cottonwood seral ecosystem association

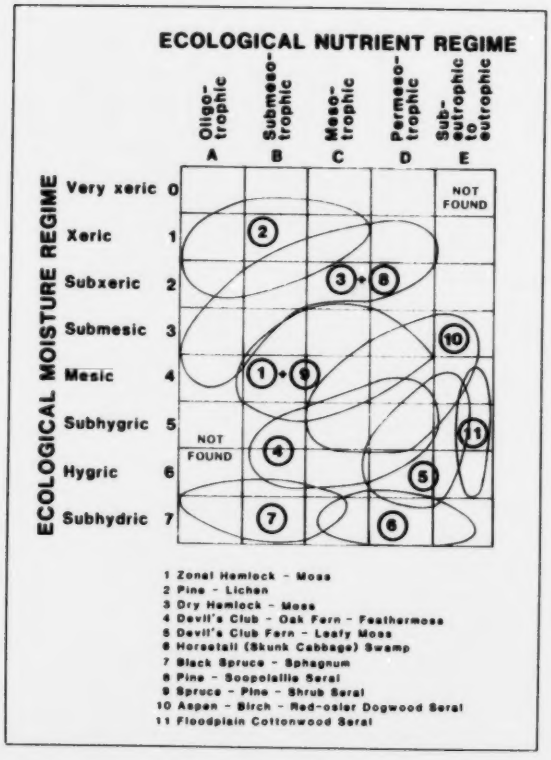


FIGURE 17. Edatopic grid of the ICHg3.

7.2 Seral Variations - [Ohg]

Frequent natural fires and widespread human disturbances have created extensive seral stands of trembling aspen and paper birch. These deciduous stands have very dense shrub and herb layers and little or no moss on the forest floor. These dense shrub and herb layers suppress coniferous regeneration. Consequently these seral ecosystem associations persist and succession is very slow. Because of their abundance and persistence, four major seral ecosystem associations have been identified and described.

7.3 Key to Ecosystem Units of the ICHg3

A Ecosystems with moderate to poor tree growth ..... B

AA Ecosystems with good tree growth ..... J

B *Vaccinium* spp. common to abundant in shrub layers C

C Pl dominates main tree canopy ..... D

D Moss layer dominated by lichens

PINE - LICHEN (ICHg3/02)

DD Moss layer a thick carpet of feathermosses ..... E

E *Shepherdia canadensis* dominates shrub layers

PINE - SOOPOLALLIE SERAL (ICHg3/08)

(i) Shallow soils over bedrock; upper slopes

Lithic phase [ICHg3/08(a)]

(ii) Coarse textured glaciofluvial deposits (terraces, eskers and kames)

Coarse textured phase [ICHg3/08(b)]

EE *Shepherdia canadensis* rare or lacking in shrub layers ..... F

F Herb layer moderately to well developed; Sx often present in main canopy

ZONAL HEMLOCK - MOSS, SUBALPINE FIR - SPRUCE SUBASSOCIATION (ICHg3/01.2)

(i) Glaciofluvial deposits; coarse textured soils

Coarse textured phase [ICHg3/01.2(a)]

(ii) Morainal deposits; fine textured soils

Fine textured phase [ICHg3/01.2(b)]

FF Herb layer very poorly developed; Sx rare or lacking in main canopy

DRY HEMLOCK - MOSS (ICHg3/03)

(i) Morainal veneers over bedrock; shallow soils

Lithic phase [ICHg3/03(a)]

(ii) Coarse textured glaciofluvial and fluvial deposits

Coarse textured phase [ICHg3/03(b)]

CC Hw dominates main canopy ..... G

G Moderately dense stands of small to medium - sized trees; Sx often present

ZONAL HEMLOCK - MOSS, HEMLOCK - (CEDAR) SUBASSOCIATION (ICHg3/01.1)

(i) Washed morainal blankets; glaciofluvial or fluvial deposits with a loamy sand to loamy texture

Coarse textured phase [ICHg3/01.1(a)]

(ii) Morainal blankets with a finer texture

Fine textured phase [ICHg3/01.1(b)]

GG Dense canopy of small short trees; Sx rare or lacking

DRY HEMLOCK - MOSS (ICHg3/03)

(i) Morainal veneers over bedrock; shallow soils

Lithic phase [ICHg3/03(a)]

(ii) Coarse textured glaciofluvial and fluvial deposits

Coarse textured phase [ICHg3/03(b)]

CCC Bl and Sx dominate main canopy

ZONAL HEMLOCK - MOSS, SUBALPINE FIR - SPRUCE SUBASSOCIATION (ICHg3/01.2)

(i) Glaciofluvial deposits; coarse textured soils

Coarse textured phase [ICHg3/01.2(a)]

(ii) Morainal deposits; fine textured soils

Fine textured phase [ICHg3/01.2(b)]

BB *Vaccinium* spp. rare or lacking in shrub layers ..... H

H Sb dominates main canopy

BLACK SPRUCE - SPHAGNUM (ICHg3/07)

HH Sb rare or lacking in main canopy I

I Equisetum spp. dominate herb layer

HORSETAIL - (SKUNK CABBAGE) SWAMP (ICHg3/06)

II Equisetum spp. rare or lacking in herb layer

SPRUCE - PINE - SHRUB SERAL (ICHg3/09)

(i) Coarse textured glaciofluvial and fluvial deposits

Coarse textured phase [ICHg3/09(a)]

(ii) Sandy loam to silt loam soil texture on morainal blankets

Fine textured phase [ICHg3/09(b)]

J Oplopanax horridus common to abundant in shrub layers ..... K

K Herb layer dominated by ferns (Gymnocarpium, Dryopteris, and Athyrium)

DEVIL'S CLUB - FERN - LEAFY MOSS (ICHg3/05)

KK Athyrium and Dryopteris spp. rare or lacking L

L Hw common to abundant in main canopy

DEVIL'S CLUB - OAK FERN - FEATHERMOSS, HEMLOCK - CEDAR SUBASSOCIATION (ICHg3/04.1)

LL Hw rare or lacking in main canopy

DEVIL'S CLUB - OAK FERN - FEATHER MOSS, SPRUCE SUBASSOCIATION (ICHg3/04.2)

JJ Oplopanax horrious rare or lacking in shrub layers ..... M

M Equisetum spp. dominate herb layer ..... N

N Act dominates main canopy

FLOODPLAIN COTTONWOOD SERAL (ICHg3/11)

NN Act rare or lacking in main canopy

HORSETAIL - (SKUNK CABBAGE) SWAMP (ICHg3/06)

MM Equisetum spp. rare or lacking in herb layer ..... O

O Moss layer poorly developed; deciduous tree species dominate

ASPEN - BIRCH - RED-OSIER DOGWOOD SERAL (ICHg3/10)

(i) Corylus cornuta dominates the shrub layer; primarily fluvial and glaciofluvial deposits in the Kitwanga - Hazelton - Kispiox area

Hazelnut fluvial phase [ICHg3/10(a)]

OO Moss layer moderately to well-developed; coniferous tree species dominate ..... P

P Vaccinium spp. common to abundant in shrub layers

ZONAL HEMLOCK - MOSS, SUBALPINE FIR - SPRUCE SUBASSOCIATION (ICHg3/01.2)

(i) Glaciofluvial deposits; coarse textured soils

Coarse textured phase [ICHg3/01.2(a)]

(ii) Morainal deposits; fine textured soils

Fine textured phase [ICHg3/01.2(b)]

PP Vaccinium spp. rare or lacking in shrub layers

SPRUCE - PINE - SHRUB SERAL (ICHg3/09)

(i) Coarse textured glaciofluvial and fluvial deposits

Coarse textured phase [ICHg3/09(a)]

(ii) Sandy loam to silt loam soil texture on morainal blankets

Fine textured phase [ICHg3/09(b)]

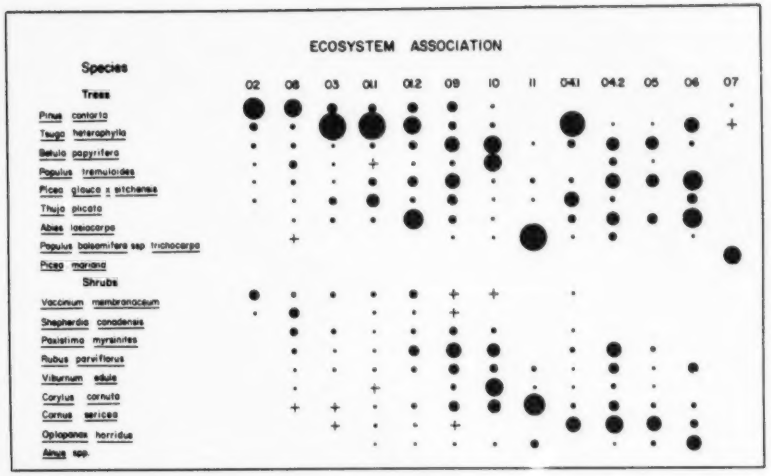


FIGURE 18. Prominence values for the major species of the ICHg3. Diameters of the circles are proportional to the prominance value, which is a measure of plant abundance incorporating both frequency and cover of the species in our sample plots. Prominance value = mean cover multiplied by the square root of frequency. + = trace.

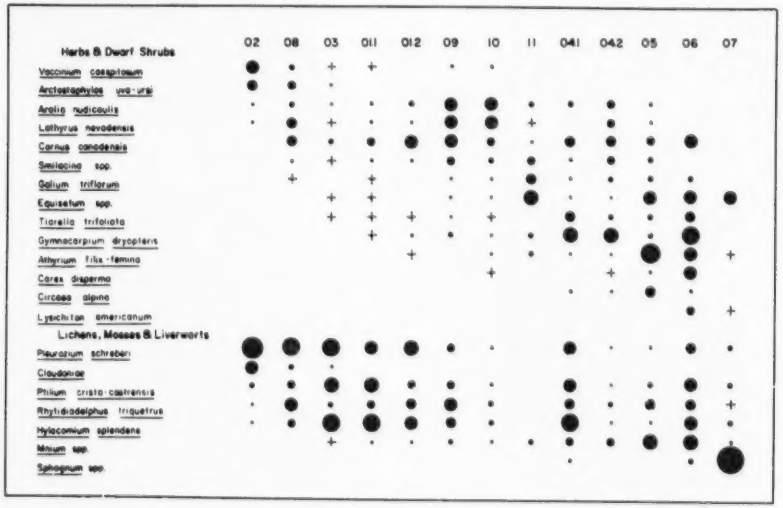


FIGURE 18. (cont'd)

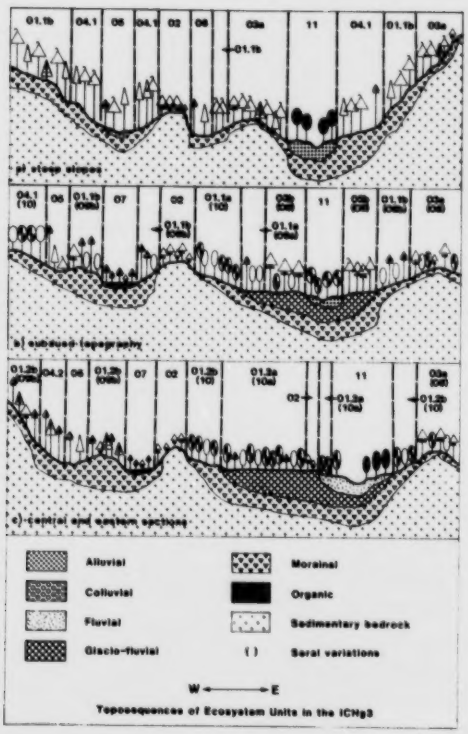


FIGURE 19. Toposequences of ecosystems in the ICHg3. Tree symbols as in Appendix 11.2.

TABLE 9. Habitat features of ecosystem units in the ICHg3

Habitat features	02	03 a	03 b	08 a	08 b	1.1 a	1.1 b	1.2 a	1.2 b
Slope class	level to mod. sloping	level to mod. steep	level to mod. steep	gently sloping	level	gently sloping	gently sloping	gently sloping	gently sloping
Slope position	slope apices	upper, ridges	terraces	upper, ridges	river terraces	middle, terraces	middle	middle, terraces	middle
Soil parent materials[1]	RO, FG	M	FG, F,(M)	M	FG, F	M, FG, F	M, F	FG	M, F
Soil texture[2]	LS	LS, SL	LS, SL	LS, SL	LS, SL	LS, SL	L, SiCL	LS	L, SiL
Drainage class	rapid	rapid	rapid	rapid	rapid	well	well	well	well
Moisture regime	xeric	submesic	submesic	sub-xeric	sub-xeric	mesic	mesic	mesic	mesic
Nutrient regime	submeso-trophic	submeso-trophic	submeso-trophic	submeso-trophic	submeso-trophic	meso-trophic	meso-trophic	meso-trophic	meso-trophic
Soil classification[3]	HFP	HFP, F	HFP, DB	HFP, F	HFP, DB	HFP	HFP, GL	SB, GL	GL
Humus form classification[4]	HAR, HAR	HAR	HAR	HAR	HAR	HAR	HAR	HAR	HAR
Rooting depth (cm)	deep, where possible	<40	>60	<40	>60	40-90	40-90	40-90	40-90
Thickness humus layer (cm)	3-5	3-5	5-10	3-5	5-10	5-12	5-12	4-7	4-7
Mineral soil pH (mean)	4.3	4.8	4.9	4.8	4.9	4.8	4.9	5.1	5.1
Humus pH (mean)	3.7	3.0	3.6	3.0	3.6	3.5	3.6	3.3	3.3

TABLE 9. (cont'd)

Habitat features	09 A	09 G	10	10a	4.1	4.2	05	11	06	07
Slope range	level	level to mod. sloping	level to mod. sloping	level to mod. sloping	gentle slopes	level to gently sloping	level to gently sloping	level	level	level
Slope positions	valleys, terraces	middle, upper	middle, lower	valleys, terraces	lower, valleys	lower, valleys	toe, valleys	valley floors	valley floors	valley floors
Soil parent materials[1]	FG	M	M	F, FG	M, FG	F, M	F, M	F	O, L, M	O
Soil texture[2]	LS, L	SL, L, SIL	SL, L	LS	L, SIL	SIL, L	SICL, CL	variable	organic	organic
Drainage class	well, rapid	well	well	well	well	mod. well, poor	imperfect	well	poor	poor
Moisture regime	aeric	aeric	aeric, subhygric	aeric, subhygric	sub-hygric	sub-hygric	hygric	subhygric, sub-hygric	sub-hydric	sub-hydric
Nutrient regime	meso-trophic	meso-trophic	meso-trophic, permeso-trophic	meso-trophic, permeso-trophic	permeso-trophic	permeso-trophic	eutrophic	permeso-trophic, eutrophic	meso-trophic, eutrophic	oligo-trophic
Soil classification[3]	HFP, DR	GL	HFP, ER	HFP, DR	HFP	ER, DGL	G	R	M, G	FI, M
Humus form classification[4]	HAR	HAR, HAR	HAR	HAR, LHAR	HAR	LHAR, HAR	HAR, HAR	Absent, HAR	HIMR, HIMOR	HIMR, HIMOR
Rooting depth (cm)	>70	25-90	30-70	>90	<70	<70	<45	>60	<40	< 30
Thickness humus layer (cm)	5-10	5-10	5-10	4-10	4-20	5-10	<40	<5	>20	< 1
Mineral soil pH (mean)	5.1	5.1	5.3	5.1	5.0	5.2	5.7	6.5	--	--
Humus pH (mean)	4.2	4.4	5.5	5.4	3.9	4.0	5.2	6.1	--	5.2

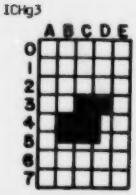
[1] Abbreviations of soil parent materials: C - colluvial; F - fluvial; FG - glaciofluvial; L - lacustrine; M - morainal; O - organic; RO - rock outcrop.
[2] Abbreviations of soil textures: CL - clay loam; L - loam; LS - loamy sand; SL - sandy loam; SIL - silt loam; SICL - silty clay loam.
[3] Abbreviations of soil order great groups: DR - Dystric Brunisols; DGL - Dark Grey Luvisols; ER - Eutric Brunisols; F - Follisols; FI - Fibrisols; G - Gleysols; GL - Grey Luvisols; HFP - Humo-Ferric Podzols; HG - Humic Gleysols; M - Mesisols; H - Regosols; SB - Sombric Brunisols.
[4] Abbreviations of humus form classification: HAR - Hemimors; HHAR - Hemihumimors; HIMR - Histimors; HIMOR - Histomoders; LHAR - Leptomoders; MAR - Mormoders; HAR - Xermors.

TABLE 10. Summary of silvicultural prescriptions and guidelines for ICHg3

Ecosystem unit	Species choice		Primary method of establishment	Site preparation		Brush potential
	Preferred	Acceptable		Mech.	Burning	
/01.1	Sx, (Pl)	Pl, (Sxw)	Planting	OK	AVOID	Low
/01.2	Sx	(Pl), (Cw)	Planting	OK	AVOID	Variable
/02	A V O I D	L O G G I N G				
/03(a)	Pl	(Sx)	Natural	AVOID	AVOID	Low
/03(b)	Pl	(Sx), (At)	Natural	AVOID	AVOID	Low
/04.1	Sx, (Pl)	Cw, Sxw	Planting	OK	OK	Moderate
/04.2	Sx	Pl, Sxw, (Cw)	Planting	OK	OK	Moderate
/05	Sx	Sxw, Pl, (Cw)	Planting	AVOID	OK	Severe
/06	Sx, (Cw)	(Cw), (Pl)	Natural	AVOID	AVOID	Variable
/07	A V O I D	L O G G I N G				
/08	Pl	(Sx)	Natural	AVOID	AVOID	Low
/09(a)	Pl	(Sx)	Natural	AVOID	AVOID	Low
/09(b)	Sx	(Pl), (Cw)	Planting	OK	AVOID	Variable
/10	F I R E W O O D	C U T T I N G				
/10(a)	F I R E W O O D	C U T T I N G				
/11	Sx, Cw	Act, (At)	Planting	AVOID	OK	Severe

7.5 Description and Interpretation of Ecosystem Units of the ICHg3

ZONAL HEMLOCK - MOSS, HEMLOCK - (CEDAR)
SUBASSOCIATION (ICHg3/01.1)



SLOPE POSITIONS: Mid-slopes.

SLOPE RANGE: Gently sloping.

ASPECT: All.

VEGETATION LAYERS[1]	SOILS Coarse textured phase ICHg3/01.1(a)	Fine textured phase ICHg3/01.1(b)
TREE: trees rather small; stands often dense. Hw (Pl) (Cw) (Bl) (Sx)	TERRAIN/PARENT MATERIALS: Morainal blankets and veneers; glacio-fluvial terraces and kames; fluvial deposits.	Morainal blankets.
SHRUB: very poorly developed. (Vaccinium membranaceum) (Amelanchier alnifolia) (Acer glabrum) (Paxistima myrsinites)	SOIL NAME: Orthic Humo-Ferric Podzols.	Luvisolic Humo-Ferric Podzols; Podzolic Gray. Luvisols.
	TEXTURE: Loamy sand to loam.	Loam to silty clay loam.
HERB: very poorly developed. (Orthilia secunda) (Cornus canadensis) (Chimaphila umbellata) (Pyrola chlorantha) (Platanthera orbiculata) (Clintonia uniflora) (Linnaea borealis)	HUMUS FORM: Hemimors.	Hemimors.
	EFFECTIVE ROOTING: Deep (40-90 cm).	Deep(greater than 60 cm).
MOSS: well-developed carpet of feathermosses. Hylocomium splendens Ptilium crista-castrensis Pleurozium schreberi Rhytidiadelphus triquetrus	OTHER FEATURES: Subsurface mineral horizons have an abundance of coarse fragments.	Fine textured soils show luvisolic development.

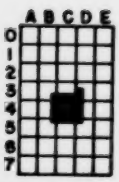
COMMENTS: This subassociation represents the climatic climax ecosystem for the ICHg3, but is relatively uncommon because of the widespread occurrence of persistent seral ecosystem associations (ICHg3/09 + 10). It is mostly found at higher elevations on north-facing slopes, away from the main valley floors.

[1] Parentheses indicate species that may have low cover or may not be consistently present.

ZONAL HEMLOCK - MOSS, HEMLOCK - (CEDAR) SUBASSOCIATION (CwHg3/01.1)

ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sx, (Pl).
Acceptable	- Pl, (Sxw). - Hw on north slopes with fine textured soils.
Logging:	- summer or winter. - AVOID EXCESSIVE DISTURBANCE.
Site preparation:	
Mechanical	- OK.
Prescribed fire	- AVOID BURNING; organic horizons are beneficial. - light burn OK if only L horizon is consumed.
Brush hazard:	- low; severity of problem is a function of the number of deciduous trees in the stand.
Reforestation:	- PLANT Sx OR Pl. - late frosts and dry spring affect establishment.
Other comments:	- establishment of spruce will be hindered by the Pineus aphid. - if advanced regeneration is used, assess for spacing at time of regeneration survey.

ZONAL HEMLOCK - MOSS, SUBALPINE FIR - SPRUCE SUBASSOCIATION (ICHg3/01.2)



SLOPE POSITIONS: Mid-slopes.

SLOPE RANGE: Gently to moderately sloping.

ASPECT: All.

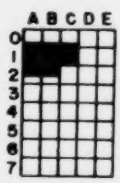
VEGETATION LAYERS	SOILS Coarse textured phase ICHg3/01.2(a)	Fine textured phase ICHg3/01.2(b)
TREE: moderate to good growth; variable species composition. Bl Pl Sx (Hw) (Ep)	TERRAIN/PARENT MATERIALS: Glaciofluvial deposits.	Morainal blankets.
	SOIL NAME: Eluviated Sombric Brunisols.	Podzolic and Brunisolic Gray Luvisols.
SHRUB: moderately to well-developed; abundant sub-alpine fir regeneration. Vaccinium membranaceum Rubus parviflorus Viburnum edule (Rosa acicularis) (Amelanchier alnifolia) (Shepherdia canadensis) (Alnus viridis ssp. sinuata)	TEXTURE: Sandy loam to loam.	Silt loam to loam.
	DRAINAGE: Good.	Good to moderately good.
	HUMUS FORM: Hemimors.	Hemimors.
HERB: well-developed compared to ecosystems of the ICHg3/01.1. Cornus canadensis Clintonia uniflora Linnaea borealis Chimaphila umbellata Pyrola chlorantha	EFFECTIVE ROOTING: Deep.	Deep.
	OTHER FEATURES: Coarse fragment content greater than 35%.	Coarse fragment content greater than 35%.
MOSS: well-developed carpet of feathermosses. Ptilium crista-castrensis Pleurozium schreberi Rhytidiadelphus triquetrus Hylocomium splendens		

COMMENTS: This subassociation is found in eastern sections of the ICHg3 where sub-boreal climatic influences are strong. Typical at low elevations in the upper Kitseguecla and lower Kispiox and Bulkley river valleys, especially where cold air drainage occurs.

ZONAL HEMLOCK - MOSS, SUBALPINE FIR - SPRUCE SUBASSOCIATION (ICHg3/01.2)

ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sx.
Acceptable	- (Pl), (Cw).
Logging:	- MINIMIZE DISTURBANCE to avoid possible soil compaction on fine textured soils.
Site preparation:	
Mechanical	- OK, BUT DO NOT SCALP. - drag equipment sufficient to provide planter access.
Prescribed fire	- AVOID; LIGHT BURN OK if no more than litter (L) layer consumed.
Brush hazard:	- variable; aggravated by disturbance.
Reforestation:	- PLANT Sx OR Pl. - plant on mounds rather than in depressions or gouges. - late frosts and dry springs affect establishment. - fine textured soil susceptible to frost-heaving.
Other comments:	- if birch or aspen present problems consider "hack-and-squirt" before logging.

PINE - LICHEN (ICHg3/02)



SLOPE POSITIONS: Slope apices and ridge crests; terraces.

SLOPE RANGE: Level to moderately sloping (0-25%).

ASPECT: All.

VEGETATION LAYERS	SOILS
TREE: trees small, of low vigour; spacing open to fairly dense. Pl	TERRAIN/PARENT MATERIALS: Rock outcrops; glaciofluvial outwash terraces, eskers.
SHRUB: low-lying, poorly to moderately developed. Vaccinium membranaceum (Salix scouleriana) (Amelanchier alnifolia) (Shepherdia canadensis) (Rosa acicularis)	SOIL NAME: Orthic Humo-Ferric Podzols with minor Eluviated Dystric Brunisols.
	TEXTURE: Loamy sand to sand.
	DRAINAGE: Rapid.
HERB: poorly to moderately well-developed. Vaccinium caespitosum Arctostaphylos uva-ursi Melampyrum lineare Chimaphila umbellata Festuca occidentalis Oryzopsis asperifolia Oryzopsis pungens Hieracium albiflorum	HUMUS FORM: Xeromors; mesimors.
	EFFECTIVE ROOTING: Shallow on lithic sites; deep in glaciofluvial materials.
MOSS: a mixture of mosses and lichens. Pleurozium schreberi Cladina spp. Peltigera spp. Cladonia spp. Stereocaulon spp. (Polytrichum juniperinum)	OTHER FEATURES: Very thin organic horizons with little water-holding capacity.

COMMENTS: This association occurs frequently on exposed and rapidly drained sites along the Skeena and Bulkley rivers; uncommon elsewhere. This e.a. represents the driest, most extreme forest sites in the Zone, sites that are submarginal for commercial timber production.

PINE - LIMBER (Pinus flexilis)

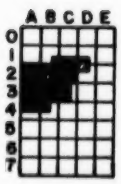
ACTIVITY OR CONCERN	
AVOID LOGGING	These ecosystems are unsuitable for timber production. If they are included within target openings, then consider their harvesting as timber mining.

DRY HEMLOCK - MOSS (ICHg3/03)

SLOPE POSITIONS: Upper slopes and ridge crests; some terraces and benches.

SLOPE RANGE: Level to moderately steep (0-45%+).

ASPECT: All.



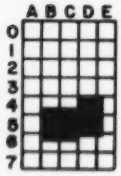
VEGETATION LAYERS	SOILS Lithic phase ICHg3/03(a)	 Coarse textured phase ICHg3/03(b)
TREE: typically a dense canopy of small, short trees. Hw Pl (Bl) (Cw)	TERRAIN/PARENT MATERIALS: Morainal (colluvial) veneers over bedrock.	 Coarse-textured glaciofluvial and fluvial deposits.
SHRUB: very poorly developed. (Vaccinium membranaceum) (Menziesia ferruginea) (Paxistima myrsinites) (Rosa acicularis) (Amelanchier alnifolia)	SOIL NAME: Orthic Humo-Ferric Podzols; Typic Folisols.	 Orthic Humo-Ferric Podzols; Orthic Dystric Brunisols.
HERB: very poorly developed. (Chimaphila umbellata) (Orthilia secunda) (Cornus canadensis) (Pyrola chlorantha) (Linnaea borealis) (Goodyera oblongifolia) (Platanthera orbiculata)	TEXTURE: Loamy sand to sandy loam.	 Loamy sand to sandy loam.
	DRAINAGE: Rapid.	 Rapid.
	HUMUS FORM: Hemimors.	 Hemimors.
	EFFECTIVE ROOTING: Shallow (less than 40 cm).	 Deep (greater than 60 cm).
MOSS: generally well-developed carpet of feathermosses. Hylocomium splendens Pleurozium schreberi (Ptilium crista-castrensis) (Rhytidiadelphus triquetrus) (Dicranum polysetum)	OTHER FEATURES: Thin accumulation of organic materials (less than 5 cm).	 High coarse fragment content (sometimes greater than 40%).

COMMENTS: This e.a. is uncommon in the ICHg3 because of the variant's history of disturbance; most such dry, poor sites presently are occupied by seral ecosystems belonging to the ICHg3/08.

DRY HEMLOCK - MOSS (ICHg3/03)

ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Pl.
Acceptable	- (Sx); a minor component of deciduous trees.
Logging:	- ADJUST TO PROMOTE Pl REGENERATION.
Site preparation:	
Mechanical	- AVOID; humus horizons are very beneficial on these units. -occasionally OK, but DO NOT SCALP.
Prescribed fire	- DO NOT BURN. - a light burn (spring) is acceptable if only L horizon is consumed.
Brush hazard:	- low.
Reforestation:	- IF REQUIRED PLANT Pl.
Other comments:	- consider removing unacceptable advanced regeneration at time of spacing. - make necessary adjustments to promote natural seeding-in of Pl.

DEVIL'S CLUB - OAK FERN - FEATHERMOSS, HEMLOCK - CEDAR
SUBASSOCIATION (ICHg3/04.1)



SLOPE POSITIONS: Primarily lower slopes.

SLOPE RANGE: Primarily gentle slopes.

ASPECT: All.

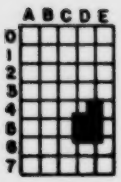
VEGETATION LAYERS	SOILS
TREE: most species have moderately good vigour. Hw Cw (Sx) (Ep)	TERRAIN/PARENT MATERIALS: Morainal blankets; fluvial over morainal deposits; glaciofluvial deposits.
SHRUB: moderately well-developed. Oplopanax horridus Ribes lacustre Viburnum edule Rubus parviflorus (Vaccinium ovalifolium) (Vaccinium membranaceum) (Menziesia ferruginea)	SOIL NAME: Orthic Humo-Ferric Podzols. TEXTURE: Loam to silt loam. DRAINAGE: Good.
HERB: moderately to well-developed. Gymnocarpium dryopteris Tiarella spp. Streptopus amplexifolius Cornus canadensis Orthilia secunda (Clintonia uniflora)	HUMUS FORM: Mormoder. EFFECTIVE ROOTING: Deep (greater than 70 cm). OTHER FEATURES: Temporary seepage is present at depths below 60 cm; high coarse fragment content in subsurface horizons.
MOSS: well-developed. Hylocomium splendens Ptilium crista-castrensis Pleurozium schreberi Rhytidiadelphus triquetrus (Mnium spp.)	

COMMENTS: This subassociation occurs throughout the ICHg3 and is most common above the major valley floors. The herb layer is lush compared with Zonal Hemlock - Moss ecosystems, but a carpet of mosses is still very visible.

DEVIL'S CLUB - OAK FERN - FEATHERMOSS, HEMLOCK - CEDAR
SUBASSOCIATION (ICHg3/04.1)

ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sx.
Acceptable	- Cw, (Pl), Sxw.
Logging:	- PROMOTE Pl REGENERATION. - MINIMIZE DISTURBANCE TO AVOID COMPACTION ON FINE TEXTURED SOIL.
Site preparation:	
Mechanical	- OK, but aggravates brush and compaction problems.
Prescribed fire	- OK, BUT USE WITH CARE. - burn should not consume more than litter (L) layer.
Brush hazard	- moderate (occasionally severe).
Reforestation:	- PLANT IMMEDIATELY WITH Sx. - late frost and dry spring affect establishment.
Other comments:	- a variety of soils exist within this subassociation; determine texture and amount of seepage prior to designating constraints.

DEVIL'S CLUB - OAK FERN - FEATHERMOSS,
SPRUCE SUBASSOCIATION (ICHg3/OA.2)



SLOPE POSITIONS: Lower to valley floors.

SLOPE RANGE: Level to gently sloping (0-15%).

ASPECT: All.

VEGETATION LAYERS	SOILS
TREE: trees moderately large, good vigour; note lack of western hemlock. Sx Bl (Ep)	TERRAIN/PARENT MATERIALS: Fluvial, morainal, recent fluvial over glaciofluvial deposits.
SHRUB: well-developed. Oplopanax horridus Viburnum edule Cornus sericea Rubus parviflorus Lonicera involucrata	SOIL NAME: Orthic Eutric Brunisols; Gleyed Dark Gray Luvisols.
	TEXTURE: Silt loam to loam.
HERB: well-developed; diverse. Gymnocarpium dryopteris Cornus canadensis Clintonia uniflora Gallium triflorum Tiarella spp. Actaea rubra Rubus pubescens Smilacina racemosa Osmorhiza chilensis Aralia nudicaulis Smilacina stellata	DRAINAGE: Moderately good to poor. HUMUS FORM: Leptomoders; Mormoders. EFFECTIVE ROOTING: Deep (greater than 70 cm). OTHER FEATURES: Seepage and mottling occur within 60 cm of the soil surface.
MOSS: poorly to moderately developed. (Ptilium crista-castrensis) (Hylocomium splendens) (Rhytidiadelphus triquetrus) (Mnium spp.)	

COMMENTS: This subassociation is found mainly at the northern and eastern extremities of the ICHg3 where sub-boreal climatic influences are strong.

Common in the Kispiox, Kitseguecla, and upper Kitwanga river valleys. Sites are usually subject to cold air ponding. Western hemlock is generally absent and subalpine fir dominates the advanced regeneration.

DEVIL'S CLUB - OAK FERN - FEATHERMOSS,
SPRUCE - SUBALPINE FIR SUBASSOCIATION (ICHg3/04.2)

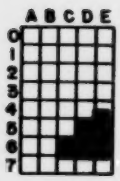
ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sx.
Acceptable	- Pl, Sxw, (Cw).
Logging:	- WINTER LOG TO MINIMIZE COMPACTION OF FINE TEXTURED SOILS. - in summer use wide-tracked vehicles or yard during dry periods.
Site preparation:	
Mechanical	- OK, but aggravates brush problem and makes fine textured soils susceptible to frost heaving. - often a good alternative to burning. - drag equipment should be sufficient to provide planter access.
Prescribed fire	- OK, USE WITH CARE. - burn should consume no more than litter (L) layer.
Brush hazard:	- moderate (occasionally severe).
Reforestation:	- PLANT Sx OR Pl. - plant on mounds rather than in depressions or gouges because of cold air ponding.
Other comments:	- late frost and dry spring affect establishment.

DEVIL'S CLUB - FERN - LEAFY MOSS (ICHg3/05)

SLOPE POSITIONS: Toe slopes and valley floors; gullies and drainage channels.

SLOPE RANGE: Level to gently sloping (0-10%).

ASPECT: All.



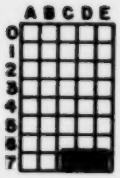
VEGETATION LAYERS	SOILS
TREE: trees generally large, widely spaced. Sx Cw Hw (Act) (Bl)	TERRAIN/PARENT MATERIALS: Primarily fluvial deposits; also washed morainal and lacustrine deposits.
SHRUB: well-developed, especially in stand openings. Oplopanax horridus Ribes lacustre Lonicera involucrata Viburnum edule Rubus parviflorus Cornus sericea	SOIL NAME: Humic Gleysols; Gleyed subgroups of Luvisols and Brunisols.
HERB: well-developed; diverse. Athyrium filix femina Gymnocarpium dryopteris Dryopteris assimilis Tiarella spp. Streptopus amplexifolius Circaea alpina	TEXTURE: Silt loam to clay loam.
MOSS: poorly to moderately developed. Mnium spp. (Rhytidiadelphus triquetrus) (Brachythecium spp.)	DRAINAGE: Imperfect.
	HUMUS FORM: Hemihumimors; Mormoders.
	EFFECTIVE ROOTING: Shallow (less than 45 cm).
	OTHER FEATURES: Permanent seepage and/or water tables close to mineral surface; mottling present close to soil surface.

COMMENTS: This e.a. is found in small pockets throughout most of ICHg3. These are productive ecosystems for most tree species. Western hemlock is confined to elevated hummocks or decaying wood and does not reach the size of other species. Where past disturbances have occurred, black cottonwood and paper birch are the main stand components and light-demanding shrub species dominate over Oplopanax horridus.

DEVIL'S CLUB - FERN - LEAFY MOSS (ICHg3/05)

ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sx.
Acceptable	- Sxw, Pl, (Cw).
Logging:	- MINIMIZE DISTURBANCE TO AVOID AGGRAVATING BRUSH PROBLEM. - winter logging is preferred (on snow and frozen ground).
Site preparation:	
Mechanical	- not recommended because of possible fine soil textures, wetness of site, and brush invasion.
Prescribed fire	- OK, unlikely to cause serious site degradation.
Brush hazard:	- severe, particularly if disturbed. - ASSESS NEED AND URGENCY OF CONTROL AT TIME OF PLANTING.
Reforestation:	- PLANT Sx IMMEDIATELY (WITH MINOR Cw). - late frost and dry spring affect establishment.
Other comments:	- these units must be planned in detail and closely controlled to avoid brush problems. TIMING IS CRITICAL. Frequent monitoring of plantation progress is necessary.

HORSETAIL - (SKUNK CABBAGE) SWAMP (ICHg3/06)



SLOPE POSITIONS: Slope bases, valley floors and depressions.

SLOPE RANGE: Level to very gently sloping (0-2%).

ASPECT: All.

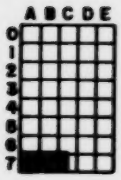
VEGETATION LAYERS	SOILS
TREE: trees small to moderately large; canopy irregular, many openings. Sx Cw Bl (Hw)	TERRAIN/PARENT MATERIALS: Organic veneers over fluvial, lacustrine, and washed morainal deposits.
SHRUB: irregular cover, generally well-developed in stand openings. Alnus viridis ssp. sinuata Lonicera involucrata Viburnum edule Cornus sericea (Menziesia ferruginea) (Oplopanax horridus)	SOIL NAME: Terric and Orthic Mesisols; Orthic Gleysols.
	TEXTURE: Organic.
	DRAINAGE: Poor.
	HUMUS FORM: Histomors; Histomoders.
HERB: well-developed, diverse. Equisetum spp. Gymnocarpium dryopteris Athyrium filix-femina Carex disperma Gaultheria hispidula Rubus pubescens (Lysichiton americanum)	EFFECTIVE ROOTING: Shallow (less than 40 cm).
	OTHER FEATURES: Thick, wet surface organic layers up to 1 m in depth; water table often within 30 cm of the top of the organic horizons.
MOSS: generally well-developed; diverse. Mnium spp. Rhytidiadelphus triquetrus Ptilium crista-castrensis Pleurozium schreberi Hylocomium splendens (Sphagnum spp.)	

COMMENTS: This e.a. is found throughout the ICHg3 but is neither common nor extensive. It is of minor importance to forest management because of its limited extent. Lysichiton americanum is an excellent indicator species when present, but is generally lacking in eastern parts of the variant. Equisetum spp. and Carex disperma are usually more reliable indicators.

HORSETAIL - (SKUNK CABBAGE) SWAMP (ICHg3/06)

ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sx, (Cw).
Acceptable	- (Cw), (Pl).
Logging:	- WINTER LOG OR DURING DRIEST PARTS OF SUMMER. - DO NOT DESTROY MOUNDS. - AVOID LOGGING POORER EXAMPLES OF THESE UNITS. - selective logging may be a viable alternative.
Site preparation:	
Mechanical	- AVOID.
Prescribed fire	- AVOID; it will reduce organic horizons. - consider planting chance before prescribing fire. - difficult to do a good job but could be used for species conversion.
Brush hazard:	- variable; depends on drainage and richness of site. - usually not required due to open stand structure.
Reforestation:	- FILL-PLANT WITH Sx (MOUNDS ONLY).
Other comments:	- due to difficulty in fully realizing potential productivity of this unit (patchy stocking), all coniferous regeneration should be accepted.

BLACK SPRUCE - SPHAGNUM (ICHg3/07)



SLOPE POSITIONS: Valley floors, depressions.

SLOPE RANGE: Level (0-2%).

ASPECT: Flat.

VEGETATION LAYERS	SOILS
TREE: trees small, stunted, irregular in height. Sb (Pl)	TERRAIN/PARENT MATERIALS: Thick organic deposits.
SHRUB: moderately to well-developed, clumped. Salix spp. Betula glandulosa Ledum groenlandicum Spiraea douglasii (Kalmia microphylla)	SOIL NAME: Mesic Fibrisols and Terric Mesisols.
HERB: well-developed, variable in composition. Carex spp. Equisetum fluviatile Menyanthes trifoliata (Gaultheria hispidula) (Andromeda polifolia) (Vaccinium oxycoccos)	TEXTURE: Organic. DRAINAGE: Poor. HUMUS FORM: Histomors; Histomoders.
MOSS: a solid hummocky mat of peat moss. Sphagnum spp. Tomenthypnum nitens Aulacomnium palustre	EFFECTIVE ROOTING: Very shallow (less than 30 cm). OTHER FEATURES: Permanent cold standing water within 30 cm of uppermost organic horizons.

COMMENTS: Bogs occur at low elevations in the main valleys of the ICHg3 but are not common and are restricted to poorly drained frost pockets. Black spruce - peat moss ecosystems are distinctive and unmistakably different from any other ecosystem unit described in this guide. These ecosystems are not considered suitable for commercial timber production.

BLACK SPRUCE - SPHAGNUM (ICHg3/07)

ACTIVITY OR CONCERN

AVOID LOGGING

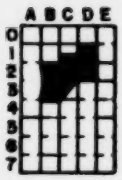
These ecosystems are submarginal for timber production. If they are included within larger openings, then consider their harvesting as timber mining.

PINE - SOOPOLALLIE SERAL (ICHg3/08)

SLOPE POSITIONS: River terraces, benches, ridges and upper slopes.

SLOPE RANGE: Level to gently sloping (0-15%).

ASPECT: All.



VEGETATION LAYERS	SOILS Lithic phase ICHg3/08(a)	 Coarse textured phase ICHg3/08(b)
TREE: trees somewhat larger and taller than in ICHg3/02. PI (At) (Ep)	TERRAIN/PARENT MATERIALS: Morainal blankets and veneers over bedrock.	 Primarily glacio-fluvial terraces; some eskers and kames.
SHRUB: moderately developed. Shepherdia canadensis Amelanchier alnifolia Rosa acicularis Rubus parviflorus Vaccinium membranaceum	SOIL NAME: Humo-Ferric Podzols; Folisols.	 Humo-Ferric Podzols; Dystric Brunisols.
	TEXTURE: Loamy sand to sandy loam.	 Loamy sand to sandy loam.
HERB: moderately diverse and well-developed. Linnaea borealis Cornus canadensis Goodyera oblongifolia Chimaphila umbellata Lathyrus nevadensis Arctostaphylos uva-ursi Vaccinium caespitosum Oryzopsis asperifolia Oryzopsis pungens Fragaria virginiana	DRAINAGE: Rapid.	 Rapid.
	HUMUS FORM: Hemimors.	 Hemimors.
	EFFECTIVE ROOTING: Shallow (less than 40 cm).	 Deep (greater than 60 cm).
	OTHER FEATURES: Thin accumulation of organic materials (less than 5 cm).	 High coarse fragment content (sometimes greater than 40%).
MOSS: a well-developed moss carpet. Rhytidiadelphus triquetrus (Ptilium crista-castrensis) (Hylocomium splendens)		

COMMENTS: Common along the major river valleys. This seral e.a. is slightly moister and more productive than the Pine - Lichen e.a. (ICHg3/02). Growth of pine is marginal for commercial timber production. If allowed to reach climax, this association would develop into the Dry Hemlock - Moss e.a. (ICHg3/03).

PINE - SOOPOLALLIE SERAL (ICHg3/08)

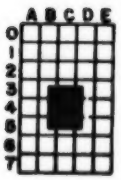
ACTIVITY OR CONCERN	
Species choice: Preferred Acceptable	 - Pl. - (Sx); a <u>minor</u> component of deciduous trees.
Logging:	- ADJUST TO PROMOTE Pl REGENERATION.
Site preparation:	
Mechanical	- AVOID; humus horizons are very beneficial on these units. - occasionally OK, but DO NOT SCALP.
Prescribed fire	- DO NOT BURN. - a light burn (spring) is acceptable if <u>only</u> L horizon is consumed.
Brush hazard:	- low.
Reforestation:	- if required plant Pl.
Other comments:	- consider removing unacceptable advanced regeneration at time of spacing. - make necessary adjustments to promote natural seeding-in of Pl.

SPRUCE - PINE - SHRUB SERAL (ICHg3/U9)

SLOPE POSITIONS: Valley floors and terraces; middle to lower slopes in rolling terrain.

SLOPE RANGE: Level to moderately sloping (0-25%+).

ASPECT: All.



VEGETATION LAYERS	SOILS Coarse textured phase ICHg3/U9(a)	Fine textured phase ICHg3/U9(b)
TREE: composition variable. Sx Pl (Ep) (At)	TERRAIN/PARENT MATERIALS: Glaciofluvial and fluvial deposits.	Morainal blankets.
SHRUB: well to moderately well-developed. Rubus parviflorus Viburnum edule Cornus sericea Rosa acicularis Lonicera involucrata Symphoricarpos albus	SOIL NAME: Humo-Ferric Podzols; Dystric Brunisols.	(Gleyed) Brunisolic Gray Luvisols.
	TEXTURE: Loamy sand to loam.	Sandy loam; loam; silt loam.
HERB: generally diverse and well-developed. Aralia nudicaulis Lathyrus nevadensis Smilacina spp. Cornus canadensis Clintonia uniflora Rubus pubescens Orthilia secunda Galium boreale Pyrola asarifolia	DRAINAGE: Good.	Good.
	HUMUS FORM: Hemimors.	Mormoders; Hemimors.
	EFFECTIVE ROOTING: Deep (greater than 70 cm).	Variable, depending on soil structure (25-90 cm).
MOSS: well to moderately well-developed. Rhytidiadelphus triquetrus Ptilium crista-castrensis Pleurozium schreberi Hylocomium splendens (Mnium spp.)	OTHER FEATURES: Soils have a high coarse fragment content.	Greater moisture and nutrient holding capacity than ICHg3/U9(a).

COMMENTS: This e.a. is widespread at low elevations throughout the ICHg3, but is especially common in eastern portions of the variant. Many of these ecosystems will develop into a Subalpine Fir - Spruce subassociation of the Zonal Hemlock - Moss e.a. (ICHg3/01.2), while others will eventually become dominated by hemlock (ICHg3/01.1) if succession is allowed to proceed. The stands are dominated by spruce in association with pine and birch, with aspen occuring only occasionally. Subalpine fir dominates the advanced regeneration.

SPRUCE - PINE - SHRUB SERAL (ICHg3/09)

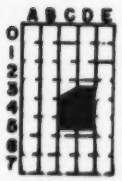
ACTIVITY OR CONCERN	Coarse textured phase ICHg3/09(a)	Fine textured phase ICHg3/09(b)
Species choice:		
Preferred	- Pl.	- Sx.
Acceptable	- (Sx); a minor component of deciduous trees.	- (Pl), (Lw).
Logging:	- ADJUST TO PROMOTE Pl REGENERATION.	- MINIMIZE DISTURBANCE TO AVOID POSSIBLE SOIL COMPACTION ON FINE TEXTURED SOILS.
Site preparation:		
Mechanical	- AVOID; humus horizons are very beneficial on these units. - occasionally OK, but DO NOT SCALP.	- OK, but DO NOT SCALP. - drag equipment sufficient to provide planter access.
Prescribed fire	- DO NOT BURN. - a light burn (spring) is acceptable if only L horizon is consumed.	- AVOID. - light burn OK if no more than litter (L) layer is consumed.
Brush hazard:	- low.	- variable; aggravated by disturbance.
Reforestation:	- if required plant Pl.	- PLANT Sx OR Pl. - plant on mounds rather than in depressions or gouges. - late frost and dry spring affect establishment. - fine textured soil susceptible to frost heaving.
Other comments:	- consider removing unacceptable advanced regeneration at time of spacing. - make necessary adjustments to promote natural seeding-in of Pl.	- if birch or aspen present a particular problem consider "hack-and-squirt" before logging.

ASPEN - BIRCH - RED-OSIER DOGWOOD SERAL (ICHg3/10)

SLOPE POSITIONS: Middle to lower slopes.

SLOPE RANGE: Level to moderately sloping (0-25%).

ASPECT: All.



VEGETATION LAYERS	SOILS
TREE: stands dominantly or completely deciduous. At Ep	TERRAIN/PARENT MATERIALS: Morainal blankets with some fluvial modification.
SHRUB: very well-developed, tall, and vigorous. Cornus sericea Rubus parviflorus Viburnum edule Rosa acicularis Lonicera involucrata Paxistima myrsinites Amelanchier alnifolia Symphoricarpos albus Salix scouleriana	SOIL NAME: Humo-Ferric Podzols; Eutric Brunisols; Podzolic Gray Luvisols.
	TEXTURE: Sandy loam to loam.
	DRAINAGE: Good.
HERB: very well-developed, vigorous, and diverse. Aralia nudicaulis Lathyrus nevadensis Smilacina racemosa Clintonia uniflora Pyrola asarifolia Cornus canadensis Gallum triflorum Osmorhiza chilensis Rubus pubescens Smilacina stellata	HUMUS FORM: Hormoders.
	EFFECTIVE ROOTING: Variable (30-70 cm).
MOSS: very poorly developed, frequently absent.	OTHER FEATURES: Relatively nutrient-rich organic and mineral horizons.

COMMENTS: This e.a. is very common at low elevations in the central part of the ICHg3. The stands are productive with a heavy or totally deciduous cover. Coniferous regeneration is sparse and suppressed by the heavy growth of shrubs and herbs. Succession to conifers is extremely slow.

ASPEN - BIRCH - RED-OSIER DOGWOOD SERAL (ICHg3/10)

ACTIVITY OR CONCERN

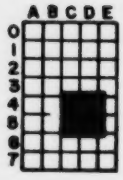
These ecosystems have little timber value at present. Rehabilitation to produce a conifer stand is very costly. Activity in this unit should be restricted to firewood cutting until effective methods of conversion are developed.

ASPEN - BIRCH - RED-OSIER DOGWOOD SERAL:
HAZELNUT FLUVIAL PHASE [ICHg3/10(a)]

SLOPE POSITIONS: Valley floors and terraces; upper to lower slopes in rolling terrain.

SLOPE RANGE: Level to moderately sloping (0-35%).

ASPECT: All.



VEGETATION LAYERS	SOILS
TREE: stands dominantly or totally deciduous cover. At tD (Sx) (Act)	TERRAIN/PARENT MATERIALS: Primarily fluvial and glaciofluvial.
SHRUB: very well-developed, vigourous, and tall. Corylus cornuta Cornus sericea Rubus parviflorus Rosa acicularis Rosa nutkana Viburnum edule Lonicera involucrata Salix scouleriana Acer glabrum Symphoricarpos albus	SOIL NAME: Humo-Ferric Podzols; Orthic and Eluviated Dystric Brunisols.
HERB: very well-developed, vigorous, and diverse. Lathyrus nevadensis Aralia nudicaulis Smilacina stellata Pyrola asarifolia Rubus pubescens Gallium triflorum Gallum boreale Osmorhiza chilensis Smilacina racemosa Cornus canadensis	TEXTURE: Loamy sand.
MOSS: very poorly developed; frequently absent.	DRAINAGE: Good.
	HUMUS FORM: Mormoders; Leptomoders.
	EFFECTIVE ROOTING: Deep (greater than 50 cm).
	OTHER FEATURES: High coarse fragment content especially below 40 cm.

COMMENTS: This phase is very common at low elevations in the central part of the ICHg1, and is characteristic of the Alkaroja-Hazelnut-Lupine sites. These are very productive ecosystems for aspen and birch. Spruce grows well, but is rarely a major stand component.

ASPEN - BIRCH - RED-OSIER DOGWOOD COVER:
MATURE PULPING PHASE (LOG3/LU13)

ACTIVITY IN CONIFER

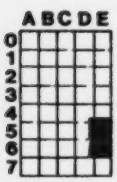
These ecosystems have little timber value at present. Rehabilitation to produce a conifer stand is very costly. Activity in this unit should be restricted to firewood cutting until effective methods of conversion are developed.

FLOODPLAIN COTTONWOOD SERAL (ICHg3/11)

SLOPE POSITIONS: Valley floors.

SLOPE RANGE: Level (0-2%).

ASPECT: Flat.



VEGETATION LAYERS	SOILS
TREE: trees very large, open grown. Act (Sx) (Bl)	TERRAIN/PARENT MATERIALS: Active fluvial (alluvial) sediments.
SHRUB: well-developed and very tall. Cornus sericea Alnus viridis ssp. sinuata Alnus incana ssp. tenuifolia Salix spp. Viburnum edule Lonicera involucrata Rosa acicularis Rosa nutkana	SOIL NAME: Cumulic and Orthic Regosols. TEXTURE: Variable.
HERB: well-developed. Equisetum arvense Equisetum pratense Equisetum hyemale Galium triflorum Pyrola asarifolia Circaea alpina Athyrium filix-femina Smilacina racemosa	DRAINAGE: Good to rapid. HUMUS FORM: Absent; thin Velomoders or Leptomoders. EFFECTIVE ROOTING: Deep (greater than 60 cm).
MOSS: very poorly developed; generally absent except on decaying wood and tree bases.	OTHER FEATURES: Very thin surface organic matter accumulations.

COMMENTS: This e.a. is common on floodplain islands and river bottomlands of the Skeena and Bulkley rivers and their major tributaries. A very productive ecosystem, but coniferous trees are slow to establish after disturbance because of the intense competition from shrubs and herbs.

FLOODPLAIN COTTONWOOD SERAL (ICHg3/11)

ACTIVITY OR CONCERN	
Species choice:	
Preferred	- Sx, Cw.
Acceptable	- Act, (At).
Logging:	- winter logging preferred.
Site preparation:	
Mechanical	- AVOID IF POSSIBLE. - consider only if a committed program of brush control is in place.
Prescribed fire:	- OK, but difficult due to poor distribution of slash and rapid brushing-in; timing is important.
Brush hazard:	- SEVERE (sometimes variable). - CONTROL REQUIRED; search for a cost-efficient method to re-establish a coniferous stand.
Reforestation:	- PLANT Sx IMMEDIATELY, preferrably with large plug stock.
Other comments:	- PLAN ALL TREATMENTS NECESSARY TO ENSURE "FREE GROWING" CONIFERS; timing is critical if brush is to be controlled. - search for apropriate herbicides.

8 THE ICHgA VARIANT

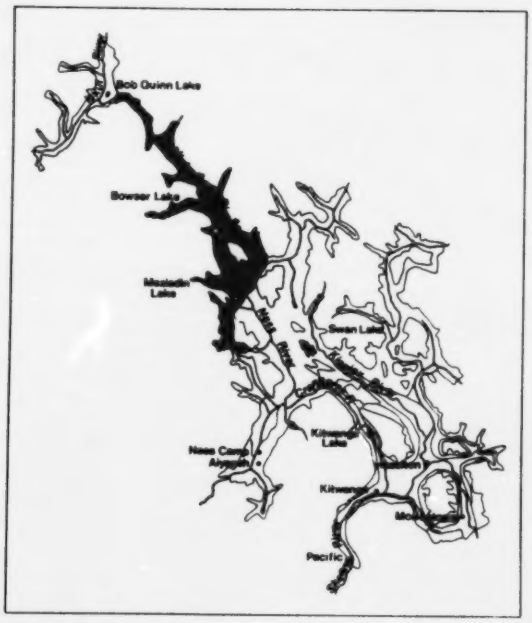


FIGURE 20. The Northwestern Transitional Interior Cedar - Hemlock Subzone Meziadin - Bell-Irving Variant (ICHgA) in the Prince Rupert Forest Region.

Preliminary studies have been done in the ICHg4, but no detailed classification or descriptions have been developed to date. We suggest that ecological descriptions and interpretations developed for the ICHg1 be used for similar ecosystems in the ICHg4. However, there are several significant differences between the two variants that are important in site identification.

The majority of the ICHg4 Variant consists of mature and overmature forests dominated by hybrid spruce and subalpine fir. Most sites are subhygric to hydric. The middle to valley bottom positions are occupied by spruce and subalpine fir ecosystems similar to those of the ICHg1/04-06 associations. Such ecosystem units dominate the landscape of the ICHg4. Oplopanax horridus and Gymnocarpium dryopteris generally dominate the understory layers of these spruce and subalpine fir forests. Western hemlock dominates only on the well-drained sites that usually occur on upper slopes and ridges. Because much of the terrain in the ICHg4 consists of steep, narrow valleys, avalanche tracks are a significant feature. These are generally treeless and inhabited by Alnus viridis ssp. sinuata and other pioneer species. Ecosystems featuring lodgepole pine are virtually lacking in the ICHg4.

TABLE 11. Summary of silvicultural prescriptions and guidelines for the ICHg4

Ecosystem unit[1]	Moisture regime	Species choice: Preferred	Species choice: Acceptable	Primary method of establishment	Site preparation: Mech.	Site preparation: Burning	Other comments
/01	Mesic	Sx	Bl, (Hw, Hm), (Pli?)	Natural/ planting	AVOID	(OK)	Small narrow openings
/02	Subxeric -submesic	Fd	Hw, (Hm)	Natural/ planting	AVOID	AVOID	Small narrow openings
/03	Subhygric	Sx	Bl, Act	Planting	(OK)	OK	
/04	Subhygric -hygric	Sx	Bl, Act	Planting	OK	OK	Winter logging preferred; brush hazard moderate
/05	Hygric -subhydric	Sx	Bl	Planting	AVOID	AVOID	Winter logging preferred; brush hazard severe
/06	Subhygric -hygric	Sx	Bl, Act	Planting	OK	OK	Winter logging preferred, brush hazard severe

[1] Preliminary names: /01 = Zonal; Hw = Bl - Vaccinium - Moss; /02 = Dry Hw - Moss; /03 = Devil's Club - Oak Fern - Feathermoss; /04 = Devil's Club - Fern - (Rafy) Moss; /05 = Horsetail; /06 = Floodplain Cottonwood.

9 THE ICHg5 VARIANT

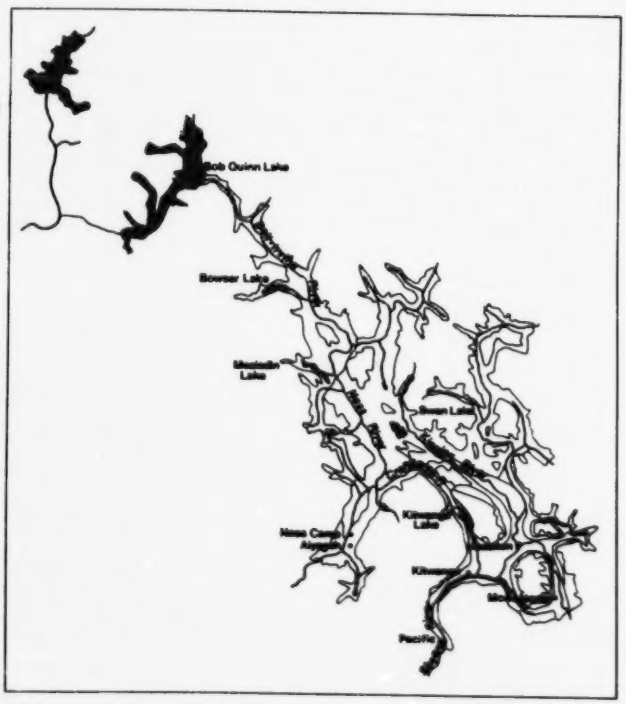


FIGURE 21. The Northwestern Transitional Interior Cedar - Hemlock Subzone, Iskut - Stikine Variant (ICHg5) in the Prince Rupert Forest Region.

The ICHg5 Variant, like the ICHg4, has been little sampled and studied. Again, the ICHg5 appears to have ecosystem associations similar to those of the ICHgl. Consequently, the ICHgl should be used as required for site identification. The ICHg5 is more similar to the ICHgl in terms of its ecosystems than to the ICHg4.

Western hemlock is the climax species and large areas of old-growth hemlock forests are present. The western hemlock - Vaccinium spp. - moss association is common on zonal sites. Subalpine fir and hybrid spruce occupy the lower slopes and valley bottoms on subhygric to hygric sites. Oplopanax horridus and Gymnocarpium dryopteris dominate the understory layers on these sites.

Drier associations such as the Dry Hemlock - Moss and Pine - Lichen are uncommon. Where they do occur, it is usually on steep, rocky, colluvial slopes or rock bluffs. Seral ecosystems are scattered and generally not common. The area around Bob Quinn Lake probably has the highest concentration of seral ecosystems. Seral forests are a mixture of lodgepole pine, aspen, and paper birch.

10 LITERATURE CITED

Coupé, R., C.A. Ray, A. Comeau, M.V. Ketcheson, and R.M. Annas (compilers). 1982. A guide to some common plants of the Skeena area, British Columbia. B.C. Min. For., Land Manage. Handb. No. 4.

Haeussler, S., J. Pojar, B.M. Geisler, D. Yole, and R.M. Annas. 1985. A guide to the Interior Cedar - Hemlock Zone, Northwestern transitional subzone (ICHg), in the Prince Rupert Forest Region, British Columbia. Min. For., Land Manage. Rep. No. 25.

11 APPENDICES

Appendix 11.1 List of Plant Names Used in the Guide

TREES:

Abies amabilis	amabilis fir
Abies lasiocarpa	subalpine fir
Alnus rubra	red alder
Picea glauca	white spruce
Picea glauca x engelmannii	hybrid white spruce
Picea mariana	black spruce
Picea sitchensis	Sitka spruce
Picea sitchensis x glauca (=P. x lutzii)	Roche spruce
Pinus contorta var. latifolia	lodgepole pine
Populus balsamifera ssp. trichocarpa	black cottonwood
Populus tremuloides	trembling aspen
Thuja plicata	western redcedar
Tsuga heterophylla	western hemlock

SHRUBS:

Acer glabrum	Douglas maple
Alnus incana ssp. tenuifolia	mountain alder
Alnus viridis ssp. sinuata	Sitka alder
Amelanchier alnifolia	Saskatoon
Andromeda polifolia	bog-rosemary
Artemisia arctica	mountain sage
Betula glandulosa	scrub birch
Cornus sericea	red-osier dogwood

SHRUBS: (cont'd)

Corylus cornuta	hazelnut
Juniperus scopulorum	Rocky Mountain juniper
Kalmia microphylla ssp. occidentalis	bog-laurel
Ledum groenlandicum	Labrador tea
Lonicera involucrata	black twinberry
Menziesia ferruginea	false azalea
Oplopanax horridus	devil's club
Paxistima myrsinites	falsebox
Ribes lacustre	black gooseberry
Rosa acicularis	prickly rose
Rosa nutkana	Nootka rose
Rubus parviflorus	thimbleberry
Rubus spectabilis	salmonberry
Salix scouleriana	Scouler's willow
Salix spp.	willow
Shepherdia canadensis	soopolallie
Spiraea douglasii	hardhack
Symphoricarpos albus	common snowberry
Vaccinium alaskaense	Alaskan blueberry
Vaccinium caespitosum	dwarf blueberry
Vaccinium membranaceum	black huckleberry
Vaccinium ovalifolium	oval-leaved blueberry
Vaccinium parvifolium	red huckleberry
Viburnum edule	highbush-cranberry

HERBS:

Aralia nudicaulis	wild sarsaparilla
Arctostaphylos uva-ursi	kinnikinnick
Arnica cordifolia	heart-leaved arnica
Aruncus dioicus	goat's-beard
Athyrium filix-femina	lady fern
Carex disperma	soft-leaved sedge
Carex spp.	sedge
Cassiope mertensiana	white mountain-heather
Chimaphila umbellata	prince's pine
Circaea alpina	enchanter's nightshade
Clintonia uniflora	queen's cup
Cornus canadensis	bunchberry
Dryopteris assimilis	spiny wood fern
Equisetum arvense	common horsetail
Equisetum fluviatile	swamp horsetail
Equisetum hyemale	scouring-rush
Equisetum pratense	meadow horsetail
Equisetum sylvaticum	wood horsetail
Festuca occidentalis	western fescue
Fragaria virginiana	wild strawberry
Galium boreale	northern bedstraw
Galium triflorum	sweet-scented bedstraw
Gaultheria hispidula	creeping snowberry
Goodyera oblongifolia	rattlesnake-plantain
Gymnocarpium dryopteris	oak fern

HERBS: (cont'd)

Hieracium albiflorum	white-flowered hawkweed
Lathyrus nevadensis	purple peavine
Linnaea borealis	twinflower
Lycopodium annotinum	stiff club-moss
Lysichiton americanum	skunk cabbage
Melampyrum lineare	cow-wheat
Menyanthes trifoliata	buckbean
Mitella nuda	common mitrewort
Moneses uniflora	single delight
Orthilia secunda	one-sided wintergreen
Oryzopsis asperifolia	rough-leaved ricegrass
Oryzopsis pungens	short-awned ricegrass
Osmorhiza chilensis	mountain sweet-cicely
Petasites palmatus	palmate colt's-foot
Phyllodoce empetriformis	pink mountain-heather
Platanthera orbiculata	round-leaved rein-orchid
Pteridium aquilinum	bracken
Pyrola asarifolia	pink wintergreen
Pyrola chlorantha	green wintergreen
Rubus pedatus	five-leaved bramble
Rubus pubescens	trailing raspberry
Senecio triangularis	arrowleaved groundsel
Smilacina racemosa	false Solomon's-seal
Smilacina stellata	star-flowered false Solomon's-seal
Streptopus amplexifolius	clasping twistedstalk

HERBS: (cont'd)	
Streptopus roseus	rosy twistedstalk
Streptopus streptopoides	small twistedstalk
Tiarella trifoliata	three-leaved foamflower
Tiarella unifoliata	one-leaved foamflower
Vaccinium oxycoccos	bog cranberry
Veratrum viride	Indian hellebore
MOSSES, LICHENS, AND LIVERWORTS:	
Aulacomnium palustre	glow moss
Barbilophozia lycopodioides	common leafy liverwort
Brachythecium albicans	lawn moss
Cladina rangiferina	reindeer lichen
Cladonia spp.	lichens
Hylocomium splendens	step moss
Hypnum circinale	moss
Mnium spp.	leafy mosses
Peltigera canina	dog lichen
Plagiochila porelloides	liverwort
Pleurozium schreberi	red-stemmed feathermoss
Polytrichum juniperinum	juniper haircap moss
Ptilium crista-castrensis	knight's plume feathermoss
Rhytidiadelphus loreus	lanky moss
Rhytidiadelphus triquetrus	electrified cat's-tail moss
Rhytidiopsis robusta	pipecleaner moss
Scapania bolanderi	liverwort
Sphagnum spp.	sphagnum or peat moss
Stereocaulon spp.	lichens
Tomenthypnum nitens	golden fuzzy fern moss

Appendix 11.2 Tree Symbols

TREE SYMBOLS

Ba	Amabilis fir	
Bl	Subalpine fir	
Hw	Western hemlock	
Cw	Western redcedar	
Sb	Black spruce	
Sx	Hybrid spruce	
Pl	Lodgepole pine	
Ep	Paper birch	
Act	Black cottonwood	
At	Trembling aspen	